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ABSTRACT

This document contains the following papers on international issues in technology and teacher education: "Developing and Researching the International Dimension in Teacher Education and Technology: A SITE Invited Panel" (Niki Davis, Therese Laferriere, Bridget Somekh, Wim Veen, and Jerry Willis); "Integrating ICT into the Curriculum: A Case Study of the Irish 'North South' Project" (Roger Austin and Jane Smyth); "A Modular Approach to Education" (Bruce Elson and Alan Phelan); "Information and Communications Technology: Teachers' and Students' Preconceptions and the Implications for Teacher Education" (D.J. Clare and J.L. Blackwell); "Promoting Collaboration in a European Context Using Multimedia and the World Wide Web" (Brian Hudson, David Owen, Alison Hudson, Eila Jeronen, and Peter Schurz); "Towards a New Curriculum for Pre-Service Teacher Education: A Response to the Challenge of the Information Age" (Marco Snoek, Douwe Wielenga, Karel Aardse, and Joke Voogt); "Preparing Student Teachers to Use ICT at Secondary School: A Course Designed at the University of Zuerich" (Wilfrid Kuster and Fortunat Schmid); "Dialogue of Teachers and Students on the Internet in Poland of the Nineties in the Context of Moulding the Creative Vital Orientations by E. Fromm" (Jacek Gornikiewicz); "Romanian Internet Learning Workshop: Building an International Community of Experts on Learning in the Internet" (Nicolae Nistor, Mihai Jalobeanu, Susan English); "The Teacher's Attitudes towards Computers in Education of Young Children" (Tamara Pribisev and Sanja Cvijic Vuckovic); "A Discussion on Integration of Educational Technology into Turkish Educational System: Is It a Tool or Aim?" (Selcuk Ozdemyr); "What Computer Education & Instructional Technology Means to Pre-Service Teachers: A Case Study of a Turkish State University" (Omer Delyalyodlu); "Furnishing Turkish Preservice Teachers with IT Skills: Hope or Hype?" (Soner Yildirim); "Preservice Teachers' Perceptions of Computer: Time Dependent Computer Attitude Survey" (Ask n Asan); "Ukrainian Teacher Education in Transition: What Role Can Technology Play?" (Valentyna Kolomiyets); "Teacher Education in Russia: History and Transition" (Ludmila Gombozhabon); "The Experience of a Teacher Educator in the Use of IT in Primary Classrooms" (Winnie So Wing-Mui, Vincent Hung Hing-Keung, Jacky Pow Wai-Cheong); "Gender-Related Differences

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in Computer Anxiety among Technological College Students in Taiwan" (Shwu-Yong L. Huang and Liu Yeon-Chaw); "The In-Service Training Programs for Primary School Teachers To Use Information Technology in Australia and in Taiwan" (Min-Jin Lin and Ching-Dar Lin); "Teachers Readiness in Using Computers in Classroom--A Study in Malaysia" (Haryani Haron and Sharifah Muzlia Syed Mustafa); "Advocating Reflective Learning in a Teacher Training Program" (Soo-Lin Teh and Fitri Suraya Mohamad); "Distance Education Based on Computer Networks in Chile Universidad de Concepcion A Special Case" (Jose Duran Reyes and Maria Ines Solar Rodriguez); "Telematics in Professional Training: New Horizons and Possibilities" (Airton Cattani); "The Integration University--School in the Development of Collaborative Projects through Internet" (Gisela E.T. de Clunie, Damaris Gonzalez, and Zenith Hernandez); "Teachers and Trainee Teacher Perceptions about Information and Communication Technology Tools During a Multicultural European Activity" (Adriane Pierrou and Christian Bessiere). Individual papers contain references. (MES)

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INTERNATIONAL

Section Editor:

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As an editor one of the joys of doing everything online is not having the long delay for papers to arrive from distant authors. On the other hand one of the disappointments is not receiving mail with beautiful and intriguing stamps in wonderfully scented paper from far away places (I treasure one received years ago from India that is lined with red silk and still smells of sandalwood.). Perhaps we should add simulated national stamps to our e-mail; e-scent I suspect, will be a long time coming.

In the past I have tried to take the reader on a round-the-world trip with me, organizing the papers in the International section as if I were a tour guide. Although that yearly tour was dear to my heart, it has become increasingly more difficult to do as this section becomes less a collection of papers from around the world and more a group of reports telling of international collaboration among teacher educators from a number of countries. As I have helped process the proposals for every conference (see the preface to this Annual and last year's) since our beginning I've had an inside view of this growth. No longer can I see this section's articles in a linear model, but rather as an interconnected, three dimensional matrix – first a bundle of a few twigs gathered together for mutual support, then more, adding strength, and finally building a structure – a home/house if you will, growing a community. At some point even paper books will have 'hot links' with articles arranged in 3-D, but until then I fall back on a somewhat linear path, linear but convoluted, like following a rabbit warren hither and yon. So come with me; our path will twist and turn and skip, but it will be worth the journey.

This year I am pleased to begin the International section with a paper from our invited International Panel organized by our Vice President for International Affairs, Professor Niki Davis, formerly UK, now, US. The other panelists are Therese Laferriere, Canada; Bridget Somekh, UK; Wim Veen, the Netherlands; and Jerry Willis, US. The panel examines the international dimension in teacher education and technology, noting that the context for education is becoming global through communication and other technologies. This provides a rich and continually expanding context for critical reflection and growth.

Crossing the Atlantic Roger Austin and Jane Smyth of Northern Ireland describe a case study of the Irish 'North South' Project." Several more papers from the UK, authored by Bruce Elson & Alan Phelan and D.J. Clare & J.L.Blackwell respectively, provide insight into IT from their perspectives.

The fifth report, from Brian Hudson, David Owen, and Alison Hudson, UK, together with Eila Jeronen, Finland, and Peter Schürz, Austria, move us to the European continent in "Promoting collaboration in a European context using multimedia and the World Wide Web." While there we visit the Netherlands for a response to the challenge of the Information Age from Marco Snoek, Douwe Wielenga, Karel Aardse, and Joke Voogt.

A short flight from the Netherlands and we're in Switzerland reviewing the work of Wilfrid Kuster and Fortunat Schmid in the development of a preservice ICT course for student teachers to use at secondary schools.

Heading northeast from the Alps we enter Poland where Jacek Gornikiewicz writes of an Internet dialogue of teachers and students. Moving southeast to Romania we nonetheless retain ties to Germany and the UK, building an international community of experts on learning in the Internet as reported by Nicolae Nistor, Germany, Mihai Jalobeanu, Romania, and Susan English, UK. Looping back to the west we explore teacher's attitudes towards computers in the education of young children as presented by Tamara Pribisev and Sanja Cvijic Vuckovic, Yugoslavia.

Sailing from Yugoslavia through the Adriatic, Ionian, and Aegean seas we arrive at Turkey where four papers take us through a number of aspects of Turkish education and IT. The reports by the respective authors, Selçuk Özdermýr, Ömer Delaýalýoðlu, Soner Yildirim, and Askýn Asan give us a number of windows through which to look at their IT and teacher education programs.

Crossing the Black Sea to the Ukraine, we are presented with a question, posed by Valentyna Kolomiyets, that we all have to face, one way or another, i.e., "What role can technology play?" The Ukraine, as are all former components of the old USSR, is in a state of extreme transition. Ludmila Gombozhabon writes of how Russia, too, is going through transition and its impact on teacher education.

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Leaving Europe and northwestern Asia we cross the land mass of China to Hong Kong where Wing-mui Winnie So, Hing-keung Vincent Hung, and Wai-cheong Jacky Pow, provide us with a case study of a teacher educator using IT in primary classrooms. From the mainland we cruise to the Republic of China for two papers. The first, by Shwu-yong L. Huang and Yeon-Chaw Liu, look at gender-related differences in computer anxiety while the second, by Min-Jin Lin and Ching-Dar Lin, looks at IT training for primary teachers in Taiwan and in Australia.

Malaysia is our next stop where two papers, by Haryani Haron & Sharifah Muzlia Syed Mustafa and by Soo-Lin Teh & Fitri Suraya Mohamad report on different aspects of IT and teacher preparation in their country.

From Malaysia take the Internet (planes take so long to cross the Pacific) to Chile and learn about distance education based on networks there with Jose Duran Reyes and Maria Ines Solar Rodriguez as guides. Crossing the great ridge of the Andes, Earth's longest mountain chain not covered by ocean waters, and skipping to the eastern side of South America we learn from Airton Cattani, of Brazil, about the new horizons and possibilities provided by telematics in professional training.

On the last leg of our trip we head north to Panamá where Gisela E. T. de Clunie, Damaris González, and Zenith Hernández write of their collaborative projects through the Internet. Panamá is a good ending for our odyssey; Yankees have had practice leaving there recently. While I am in a geographical mind, I am reminded of a fact I have always found curious, that the Atlantic opening of the Panamá Canal is northwest of its Pacific mouth, a good example of perception versus reality. For those who might doubt, see the map, brought to you through ICT, specifically: http://geography.about.com/

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Developing and Researching the International Dimension in Teacher Education and Technology: A SITE Invited Panel.

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Abstract

SITE'00's theme is building bridges among professional associations so it is only right that one the panels should look at the joys and challenges of developing and researching an international dimension in teacher education. The panelists come from both sides of the Atlantic and will stimulate the discussion though their experiences of collaborating across communities, cultures and languages. Niki Davis and Wim Veen have been developing and researching European teacher training enhanced through information and communications technologies. Bridget Somekh has been working with teacher educators in Europe to inform a view on pedagogy with new technologies. Therese Laferriere's focus has been the development of teacher education across borders and cultures in North America. Jerry Willis has recently been focusing on curriculum reform in the Ukraine.

Background

The theme of this year's SITE conference is bridges among professional associations. This panel will consider the growing importance of international collaboration for teacher educators. International collaboration between two associations also brought the panel together led by the first and last authors. Niki Davis was the current chair, or president, of

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the UK Association for IT in Teacher Education in the year that the Society of IT in Teacher Education formed in the USA. She met Jerry Willis, the founding president of SITE, at an international conference in Belgium and as a result of expressing the challenges of developing IT for teacher education was invited to give the Keynote speech for SITE'91 in Greenville North Carolina(Davis, 1991). The Associations formed close collaboration to the benefit of both. As the older but smaller organization, which aims to promote both good teacher preparation and scholarship, ITTE struggled to support the international community. However, ITTE was happy to support the growth of SITE and certainly has grown both in numbers and in participation across the world.

Why does the society need a panel on international collaboration?

The Society for IT in Teacher Education is an international Society that actively promotes collaboration for the benefit of its membership and the scholarly field. The current Vice President for International liaison is Niki Davis, the leader of this panel. In addition, there are at least three reasons to incorporate a global dimension in teacher education:

1. The context for education is becoming global
2. Communication and other technologies are being used to increase access to education on a global scale
3. Taking a global view can enhance teacher education through the provision of stimulating rich contexts for critical reflection.

At last year's SITE'99 conference Niki Davis argued this in some detail (Davis, 1999) referring firstly to the commercial situation, which is now possibly more influential that national politics:

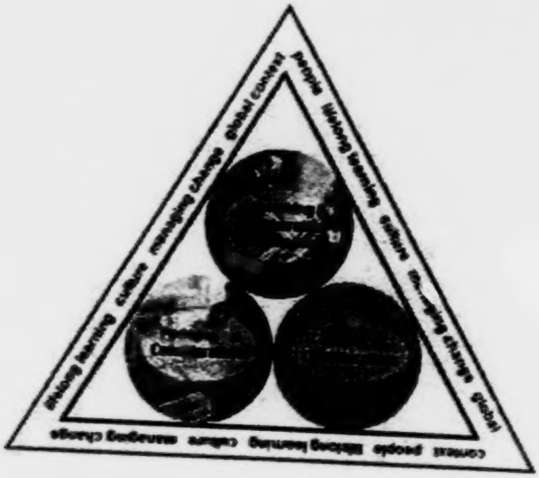
> As teacher education moves towards more complex organizational arrangements of collaboration and competition at different levels, we are following similar trends in commerce and industry pushed and pulled by Globalization. Dauphainais & Price (1998) edited together the views of prominent chief executives under six themes, with the first as Globalization. The others were radical change, leadership, culture, innovation and customer service. The five latter themes are already challenges in teacher education and this paper suggests that we must also face up to our role in the globalizing of our cultures as workers across the world struggle for job retention and standard of living enhancements made possible through the *"uncoupling of the corporation from the nation state. Rapid free flows of technology, capital, and employment contribute to this 'global village' effect." (p21)*

In that SITE'99 paper provided suggestions of exemplary technology resources linked to SITE's Principles for technology in teacher education as well as a framework for curriculum development created by the international T3 project working across Europe (Davis and Tearle, 1999). Both Wim Veen and Niki Davis may use T3 Core Curriculum within the panel discussion, see Figure 1 for the holistic treatment of the three main dimensions bound together by lifelong learning, globalization and management of change:

1. collaboration & networking

2. pedagogy
3. technology

Figure 1. The T3 Core Curriculum International Principles


people lifelong learning culture managing change global
context people lifelong learning culture managing change
lifelong learning culture managing change global context

For the international dimension it is particularly important to pay structured attention to collaboration and networking. However perhaps as other panelists explore the socio-cultural dimension we will together suggest that all these dimensions are important to all programs of teacher education across the globe.

Educating for Agency across the globe

Bridget Somekh's view of developing and researching the international dimension in teacher education and technology will draw upon two major scholarly activities. She has led the Community of Action Research Network and its international journal since its inception with John Elliott and colleagues. More recently the work of the REPRESENTATION Project, sponsored by the European Union, which is using concept mapping as a tool to capture children's mental schema for new technology, has informed her views (see for example Baron, Bruillard & Dansac, 1999). Representation is a research and development project funded by the European Union through the Multimedia Task Force. Kathy Kikis-Papadakis, FORTH, Institute of Applied and Computational Mathematics, Greece, coordinates the project. The partners are INRP, France; Orfeus, Denmark; MAC, Ireland; University of Crete, Greece; University of Amsterdam, The Netherlands; Open University of Catalunya, Spain; and University of Huddersfield, UK. Associated partners are IUFM de Creteil, France; and the University of Mons-Hainaut, Belgium.

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The project has led Bridget to question to what extent existing education systems are capable of meeting the needs of today's young children, given the rapid infiltration of new technology into their lives. Bridget may clarify how the comparison across different countries and educational systems has enabled her to better argue that it is imperative to change some of the structural factors in education systems that currently prevent teachers from meeting children' needs. Her argument is that changes are possible that would enable us to use the capabilities offered by new technology tools to meet the socio-cultural needs of local communities. Bridget will end by arguing that we should educate for agency, to produce teachers and young people who believe that they are capable of making a difference to existing systems and enjoy the challenge of change.

TeleLearning Professional Development schools

The North American experience of professional development through communications technologies also holds valuable insights into the collaboration across institutions and countries to create new professional communities. These communities "reach far beyond a school or university by including among their active participants teachers, students, undergraduates, and various other experts from a number of schools, universities and associations." Therese Laferriere and her colleagues in the TeleLearning Network of Centers of Excellence are researching and developing models of time and information management between and within sites (Laferriere, 1999). In this research they note the importance of providing opportunities for 'the construction of shared understandings of teaching and learning'. The panel may explore how close these are to the European T3 projects' core curriculum that includes a dimension for both 'pedagogy' and 'collaboration & networking'.

Central and Eastern European challenge

In addition to the fast moving changes of technology some countries are also experiencing enormous changes in their educational systems. Jerry Willis will reflect on the challenges of providing support through international collaboration from the USA to the Ukraine. Where colleagues are under such stress it can be difficult to avoid cultural imperialism. Yet there is no doubt that the challenges of a centrally imposed curriculum that has now been swept away, led to a reaction in education. At times there is evidence of a much richer appreciation of literature and culture than might have been expected plus an extraordinary appetite for study. Support for Ukrainians redeveloping their curriculum can have benefits for their supporters in promoting reflection of the important value for education across the globe. Such challenges to pedagogical and curricular change have also been evident in international collaborations between Western and Central Europe as in the MATEN project for example, which is developing on-line multimedia courses with colleagues in four central and eastern European countries including the Ukraine (Dovgiallo et al, 1998).

The panels' discussion questions

- What added value does an international dimension provide for teacher education?
- What are the keys points for implementing international collaboration?
- What are the important research questions relating to international teacher education?
- Should all courses of teacher education strive for an international dimension, or is only important for some? e.g. advanced postgraduate courses
- What can SITE do to promote international collaboration and support in teacher education?

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Education (CRITE) and to research the need for a global degree for 'Leadership in educational technology'.
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Integrating ICT into the Curriculum: A Case Study of the Irish 'North South' Project

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Abstract: Government Departments of Education in Northern Ireland and the Republic of Ireland emphasise the need to integrate ICT into the schools' curriculum. The training of teachers and student teachers is vital to the success of this integration. This paper reports on the North South ICT Project which was set up to contribute to these aims by involving teacher training in ICT in several areas of the curricula on both sides of the Irish border. The paper also reports on the Project's efforts to promote mutual understanding through ICT between pupils from two divided communities in Northern Ireland and pupils in the Republic of Ireland.

Introduction

Ensuring that pupils keep pace with the Information Society has been exercising the minds of policy makers in the departments of Education in Northern Ireland and the Republic of Ireland for several-years. Agencies have been set up by both departments to implement quality ICT initiatives in schools. (Northern Ireland Network for Education http://www.nine.org.uk/ and National Centre for Technology in Education http://www.ncte.ie/index.htm). The integration of ICT into the curriculum is considered essential in these initiatives. The training of teachers and student teachers in the use of ICT in the classroom is also seen as imperative.

One initiative, the North South ICT Project, funded by both government departments of education and co-ordinated by the University of Ulster (UU) and National University of Ireland Maynooth (NUIM) was carried out during the academic year 1998-1999. The Project used a web-based computer conferencing system, Web Crossing and videoconferencing to link 20 student teachers from both universities, 26 teachers and 300 pupils in post primary schools in Northern Ireland and the Republic of Ireland. The pupils were in the age group 15 - 17 years. The collaboration led to a range of twelve cross-border curriculum-based projects on the theme of "This Island we live on", published as part of a website, www.ulst.ac.uk/thisisland/

The aims of these links were to increase ICT competence of student teachers, teachers and pupils in schools, to produce curricular resources through collaborative ICT school projects and to use ICT to foster collaboration and mutual understanding on both sides of the Irish border.

The term ICT is a wide one and whilst many aspects of it were included in the North South Project, the emphasis was on the 'C' element of ICT, namely communication. It was a key factor of the Project that this subset of ICT remained inside the curriculum (Misanchuk et al 1997; Austin 1995; Riel, 1992; Teles and Duxbury, 1991).

Data Sources

This paper evaluates the North South Project from the perspective of practice and attitude towards the integration of ICT into the curriculum. Evidence was gathered by use of questionnaires, pre and post Project, issued to all participating teachers and student teachers. Focus group interviews were carried out with teachers and pupils in 4 schools and with teachers only in 4 other schools. An external report was incorporated into the final internal evaluation. In addition, all student teachers in Northern Ireland who were involved in the Project produced evaluation reports on the North South Project as part of their final assessment.

Also, as part of the overall evaluation, student teachers and teachers were encouraged to contribute short progress reports to a specially created discussion, called *Reflections,* in the computer conference served by Web

Crossing. These and all other messages to conferences were regularly examined, as this was considered a valuable source of information. (Kaye, 1991; Harrington and Hathaway 1994; Marttunen, 1997).

Training in ICT

Integrating ICT into the curriculum at schools obviously needs the full co-operation of teaching staff, and training is essential. Government strategy emphasises the training of student teachers and teachers. The strategy adopted by the North South Project was to place student teachers in Project schools to work alongside subject specialist teachers and to provide them all with the necessary technical skills to enable them to fully participate in the project.

At the outset of the project one of the main concerns registered by teachers was their lack of technical skills. In January 1999, separate training workshops were organised in UU and NUIM to give participants hands-on experience of using both computer conferencing and videoconferencing technologies. These workshops were attended by student teachers, teachers and other school staff including ICT coordinators and in some cases vice-principals and principals. Project staff visited the schools in the following weeks to ensure the equipment was working properly and the appropriate settings were being used. Schools were also able to test the new equipment by carrying out trial videoconferences with NUIM and UU.

It was also noted that student teachers at both universities were taught ICT skills in different ways. At NUI Maynooth all Education students were obliged to participate in a basic course in ICT. A small number elected to take an additional course in ICT. The student teachers involved in the North South Project belonged to this latter group. Neither ICT course had a connection to students' subject specialism. For student teachers at UU, integrating ICT into their classroom activities ran parallel to their own subject specialist training, where computers formed an integral part of their learning at the university.

Strategy for Planning Projects

In early February 1999, a two-day residential meeting was held in Belfast to organise curricular projects. This was attended by teachers and student teachers from the 13 participating schools from both sides of the border, with representatives from the Department of Education Northern Ireland (DENI) Inspectorate, and academic staff from UU and NUIM. At this first planning conference in Belfast it was observed that teachers still seemed apprehensive about the new technologies despite the initial training they had received in January.

Teachers and student teachers were initially divided into subject groups to discuss areas of the two curricula where collaborative projects could be developed. Since the curricula in both jurisdictions differ significantly, this was quite a challenge. As common ground was established, clusters of two to three schools agreed to produce projects in Art, Design and Technology, English, Geography, History, Home Economics and Music.

Before the conference concluded, each project group was asked to complete a Project Agreement Form which outlined the details of the proposed project including the contribution of each school, a draft project timetable and agreed modes of communication within the project group. A prototype of the project website was presented at this inaugural meeting, showing where the curricular resources produced by the projects would ultimately be published. The potential use of digital cameras to complement project work was also demonstrated.

After 6-8 weeks work, a second meeting, to evaluate progress, was held in NUI Maynooth in April 1999. At this meeting teachers were encouraged to take more responsibility for the projects rather than depending too much on student teachers. This was in recognition of the fact that student teachers would soon leave the schools and that teachers should feel confident to continue with ICT without their support.

Integrating ICT into the Curriculum

Schools showed a lot of imagination in their choice of study and topics were chosen with care in order to accommodate the demands of the curriculum in both Northern Ireland and the Republic of Ireland. Projects all had a North South dimension in keeping with the theme "This Island we Live on". One history project, *'Ireland in World War One - Heroes and Traitors'* gave schools the opportunity of studying Irish Nationalism from a

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southern and northern perspective. It also allowed pupils to examine in detail some of the historic figures of that era who had connections to both parts of the island of Ireland.

One teacher, who was involved in a second history project, called *'Ireland in World War Two'*, found that integrating ICT into her subject area had acted as a 'strong motivational factor' for the pupils. It had given the subject,' a clear, immediate and relevant purpose', making them see 'history as a living subject'. Again, the cross-border perspective was very valuable in enabling pupils to see a fuller picture, e.g. the effects of World War Two on one part of the country that was a combatant and another that was neutral.

A student teacher involved in one of the schools commented: *" Through the exchange of ideas pupils agreed that their learning was heightened and accelerated. The diversity of ideas also presented the pupils with further stimuli."*

The choice of a Yeats poem as an area of study was an example of a compromise. In Northern Ireland, schools were happy to incorporate it as a practice for unseen poetry for the Advanced Level Examination in English Literature while Yeats's poetry features on the Leaving Certificate syllabus in the Republic of Ireland.

Another English project, *My Place Your Place,* put the emphasis on creative writing, relevant to both curricula, while at the same time exploring local areas and presenting a flavour of each. One geography project consisted of a comparison of urban renewal in two cities, Dublin and Derry.

In another English project, *The Pity of War*, background information was presented on the 1916 battle of the Somme. This was connected to two World War One poets, and in turn to evaluations of their poetry, enabling pupils to see how the poetry could not be separated from the war. Information on Irishmen who fought in the war was connected to a creative writing exercise, thus bringing the whole experience of the poetry and its context to life.

The most rewarding experience for one of the Music teachers was when her pupils joined their counterparts across the border for a series of live musical performances via videoconferencing. On one occasion, the pupils had written a poem based on the theme of peace and reconciliation, and then set it to music. The song was performed live in a videoconference, with the two schools, north and south, taking turns to sing a verse.

For older pupils in particular, curriculum relevance was an important aspect of the North South project. Comments from pupils themselves, as they embarked on the project, indicated that their aspirations included increasing their understanding of subject. *"...Another reason why I got involved was that I am looking forward to getting other peoples opinions about Nationalism and World War 1."* Dialogue with distant collaborators led to new insights into the area of study. In general, adding to the body of knowledge of the pupils came in the form of another perspective. One teacher commented: *"The pupils have gained ICT skills and a deeper knowledge of history, with the added advantage of seeing events from other perspectives and gaining research and improved literacy skills"*.

The importance of learning through relating to others by computer is emphasised by researchers (Kaye 1991; Austin and Mendlick, 1993; Harasim et al, 1995; Marttunen, 1997). The North South Project is an instance where different perspectives on a topic coming from Northern and Southern pupils enabled such collaborative learning. Many pupils highlighted the importance of another perspective, especially in the study of history.

ICT in Cross-Curricular Themes: Education for Mutual Understanding

Evidence showed that the North South Project involved both 'intentional' and 'experiential' learning, (Lewis, 1997) the latter often taking the form of cultural awareness. Because the schools chosen included those from within the Catholic sector and State sector (mainly Protestant pupils) in Northern Ireland as well as schools from the South, this cultural awareness was a three-way process. The need for increasing cultural awareness was reflected in the following comment by one Northern pupil: *'Forming links with other schools is needed especially with the way our country is at the moment'.*

Broadening horizons was very much a part of the North South project as pupils engaged in voyages of discovery of their own and others' areas. The '*My Place Your Place*' English project provided many opportunities to investigate locality (Riel, 1992) under several headings, including local personalities, local writers, colloquialisms and more. In a sociology/home economics project called *The Family* the study of two social security systems gave a valuable insight into the similarities and differences that exist on both sides of the Irish border. The *Transport* project, which drew in pupils from Design and Technology and Geography involved surveys of modes of transport used by pupils coming to school, concentrating on traffic congestion, a problem experienced both in Dublin and Belfast. Investigation of urban renewal in Derry and Dublin in another Geography project allowed pupils the opportunity of witnessing many similarities in city life on both sides of the border.

The different perspectives of pupils on both sides of the border were an integral part of the history projects. All of the projects were designed to open up pupils' minds and make them aware of life in two divided communities in Northern Ireland and also life on the other side of the Irish border. This filled the need of pupils as expressed by one teacher, "to find common culture in their daily lives."

Robinson (1995) warns of the danger of stereotyping caused by passive use of media. However, active use of media can present a different picture. Research has shown that impressions of Northern Ireland change when young people from other countries have direct contact, using electronic communications, with young Northern Irish people (Austin, 1997; Austin and Mendlick, 1993; Smyth, 1999). In the North South Project, pupils from the South were introduced to "ordinary" pupils from both communities in Northern Ireland who live normal lives not dominated by "the Troubles".

The Process of Learning using ICT

The use of video conferencing and Web Crossing enhanced interaction within and between project groups. Pupils were able to share ideas and experiences as well as text and image files. Video conferencing was new to the majority of pupils, student teachers and teachers involved in the project. While this proved to be an exciting experience for most, it also needed at least one attempt before student teachers and teachers felt competent with it. Student teachers felt that structured video conferencing, with a maximum of six pupils worked best and various strategies were used to put pupils at their ease. Video conferencing proved to be the highlight of the North South Project for pupils who were excited by the prospect of "seeing and talking to people over a hundred miles away". Most project groups took part in at least two videoconferences.

Teamwork

Teamwork in the North South project existed on two levels, within each school and inter-school. Access to different perspectives because of the different backgrounds of participating schools was one of the main benefits accrued from this teamwork. The benefits of co-operation and collaboration made possible by computer and video conferencing (Robinson, 1995; Lewis, 1997) were evident in all projects to varying degrees. Working as part of a team was one of the most important skills acquired, according to pupils interviewed.

Collaboration was, however, impeded at times because of difficulty of access to computers. There were not enough opportunities to gain a lot of practice with video conferencing, as these synchronous conferences were notoriously difficult to arrange between schools. Findings also suggest that better collaboration might have occurred if access by pupils to Web Crossing had been more frequent. Also in order to increase academic interaction, more guidance from teachers and student teachers would be needed, as this type of academic debate was a new experience for pupils. There is evidence of better social interaction between pupils than academic interaction in Web Crossing. This is in contrast to the interaction using video-conferencing, where pupils were more relaxed when the focus was on work rather than on themselves.

ICT without the 'C'

All aspects of ICT, not just the communications element were utilised during the project. Student teachers found the North South Project gave them more confidence in putting computer packages demonstrated in their Education courses into use in a school environment. The majority of pupils got the opportunity of using a digital camera. In some cases, self-portraits were posted into Web Crossing accompanied by a digital photo. Others used the camera to take photos for inclusion in the finished product. Apart from using the Internet for communication purposes between schools, research was carried out using the World Wide Web and maps, diagrams and graphics were also cut and pasted from the Internet. Pupils also scanned pictures from textbooks to illustrate the project and used the computer for planning, drafting, editing and designing a layout for their publication; a minority of pupils used desktop publishing to present their project.

The Product

The collaboration on the North South Project culminated in the production of a total of twelve projects in seven areas of the curriculum. These were presented in the form of pages in the main website called "This Island we live on". This was seen as crucial in the integration of ICT into the subject area. Pupils had a tangible goal at which to aim. They looked forward to seeing their work on the World Wide Web presented as learning resources for other pupils to access. This was the "pay-off" recommended by Teles and Duxbury (1991) in the form of an electronic anthology. Evidence coincides with findings of Cohen and Riel (1986) and Austin (1995) that writing for an audience produced higher quality work. However, findings suggest that pupils should have been more involved in the completion of the project for the website, allowing them to engage in development of higher order critical thinking skills.

Student Teacher and Teacher Collaboration in ICT

One aim of the North South Project was training student teachers in the integration of ICT into their chosen subject while at the same time being "ambassadors" for ICT in the schools in which they did teaching practice. A recent UK study into the effectiveness of ICT in schools shows that teachers are still quite sceptical about ICT improving the quality of learning. In particular, teachers felt that their perceptions of the value of ICT differ from those of the policy makers (Cohen, 1999). In the North South Project, incorporating ICT into the curriculum was seen as a problem by some of the older teachers, whose teacher training took place before the widespread use of technology. Evidence shows that the student teachers played a very active role and often took the lead in promoting ICT in schools. Even though many of them had very little experience of ICT, their enthusiasm was very evident from comments such as:

"Nine months ago I didn't know how to word process, never mind send electronic mail or videoconference, so this year has been one great, enjoyable introduction to ICT."

According to informal feedback obtained from school visits, one of the key issues which seemed to impede progress in projects was an over-reliance by teachers on the student teacher's technical skills. In the last term, as examinations approached, the student teachers felt the strain of this responsibility.

Because the student teachers were often seen as the local expert in the school, it was very important that they felt supported by the universities when technical issues arose. The importance of quick responses in Web Crossing was emphasised by all student teachers. Heflich (1996) draws attention to the role of outside agents, such as universities, in the successful implementation of online computer technology in schools. The link to the universities in the North South Project provided a 'comfort zone' as assistance with technological problems was always at hand. Although this assistance was, in theory, available to all participants in the Project, it was only the student teachers that took advantage of it.

However, it emerged in many of the teacher interviews that as the project progressed the teachers gained more confidence and practically all of them believed the project had given them a real appreciation of the potential of ICT as a valuable teaching tool.

While projects such as North South motivate staff, it is important that this energy and motivation is sustained in order to support the strategies of the Departments of Education in both jurisdictions to equip teachers and student teachers with the skills necessary to integrate ICT into the curriculum. The North South Project recognised that student teachers were only temporary members of staff in their practice schools and the duration of the Project may not have been long enough for ICT skills to be assimilated by full-time teachers. The strategy adopted therefore at the second face-to-face meeting in April was to put more focus on teachers' input and to invite schools to continue the work the following year, even without student teacher support.

Conclusions and Recommendations

The North South Project attempted to implement some of the ICT aims of the Departments of Education in Northern Ireland and the Republic of Ireland in its overall framework. Improved confidence and competence of student teachers, teachers and pupils in the use of ICT, its integration into the curriculum and as a vehicle for cultural awareness were outcomes of the Project. Technical support from the co-ordinators at the universities and also, in some cases, assistance from ICT technicians in the schools resulted in much greater awareness of the potential of ICT. As well as academic interaction, there was evidence of social interaction, particularly visible in Web Crossing. Access to different perspectives was considered to be very valuable.

The greatest challenge to the use of ICT, from the teachers' perspective, appeared to be restricted access to the Internet. Better online facilities in schools would facilitate more regular pupil involvement, resulting in more frequent communication. Increased training of teachers in the use of ICT would lead to a better 'comfort zone' around computers and hence more confidence in using them. Correct timing for the Project was another factor determining its success. All schools interviewed considered that the first term would be more suitable for such projects because teachers are less busy with examination classes, and student teachers are less busy with their own studies.

Opportunities to follow through these issues will arise in a new project entitled "Dissolving Boundaries through Technology" which will involve 25 schools on each side of the Irish border and will run from 2000-2001.

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A Modular Approach to Education – Its Application to the Global Campus

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Abstract: A range of pedagogic, administrative, socio-economic, structural and resource issues surround the establishment of a global campus. This paper identifies and discusses such issues, and suggests that pedagogic aspects are paramount. The limitations of conventional subject-based approaches are considered, and local experience in curriculum design and module integration is discussed in the context of flexible learning, wider access and participation. The need for a range of learner support mechanisms is indicated, and our implementation (together with others) is described. The concept of a global campus is underpinned by appropriate technological developments. Internet- and Web-based experience is discussed, as is the need for more radical approaches such as Virtual Reality techniques.

Introduction

The nature of higher education (H.E.) is changing globally: the convergence of wider access demands, greater emphasis on vocational preparation, new teaching and learning delivery mechanisms, and the emergence of globalised economies is propelling forward-looking H.E. institutions into careful self-analysis. At the same time, many countries (for example, U.K., Australia, U.S.) are witnessing a withdrawal from state-funding for both H.E. institutions and for student maintenance costs. With other but equally significant structural and resource difficulties, developing nations also share these problems (Koul, 1995)

As well as financial challenges, certain global trends are beginning to emerge. Valcke and Vuist (1995) describe experiences in the Netherlands that matches our local experience in the UK. Demographic changes mean that the profile of the traditional student is becoming older, often working or balancing the requirements of other family/career commitments: this implies a growing demand for increased part-time and more flexible learning provision. An increasing number of UK institutions have adopted a modular approach to course design and delivery – see, for example, George, Murfin, and White (1992). At the same time, there are many pressures for more effective teaching and learning delivery mechanisms. Active learning, student-centred and case-led methods are now accepted parts of the educator's canon (Rogers [1991]), and such changes have been growing in influence since the late 1980s. What is now emerging as a radically different and (potentially) revolutionary change is the use of Internet- and Web-based delivery channels.

Open Learning and emancipation

Before discussing such issues, it is worth recalling that one of the strengths of an open learning approach is what Reid (1995) refers to as an 'emancipatory tradition' - the barrier-dissolving aspects of such learning. Such emancipatory aspects are principally associated with learners previously denied access to education and assume a much wider relevance within the context of a global campus. Reid (1995) directs our attention to 'structural constraints' relating to institutional, social, cultural, and political/economic factors. While the cost of commissioning and building new higher education institutions may stretch the financial resources of the developing countries, the ability to 'tap' in to such programmes of study offered via the Web may be of great emancipatory, as well as economic, potential.

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This implies fundamental challenges for the future of higher education. Dolence (1995) suggests that these challenges stem from the use of an educational model developed from and for an industrial model of society. Is this appropriate in what Dolence calls an 'information model' of society? Is the cost model of such a paradigm still valid given the nature of such an "Information age"? Can the higher education sector ignore the potential of technologies such as Web-based 'push' technology, 'click-thru' mechanisms, video-conferencing, and virtual reality models?
In a wide-ranging survey of current thinking about pedagogical issues facing H.E. Diana Laurillard articulates the necessity of 'situation-learning' (Laurillard, 1993). Such learning implies that "the acquisition of inert concepts (e.g. algorithms, routines, decontextualised definitions - i.e. the stuff of many university courses) is of no use if the student cannot apply them...[We] have to use our knowledge in *authentic activity*, i.e. genuine application of the knowledge; this allows us to build an increasingly rich understanding of the tool itself and how it operates" (page 17). Here, the application of Virtual Reality models and techniques offers potential for implementation of 'authentic activity' and 'situated learning'.

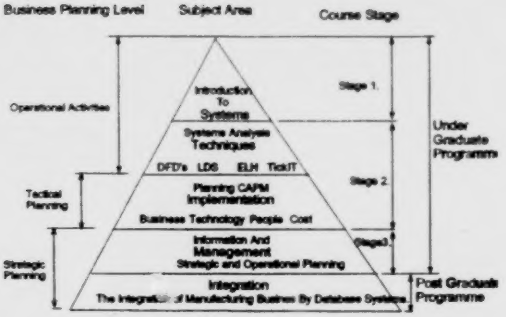
Globalised education

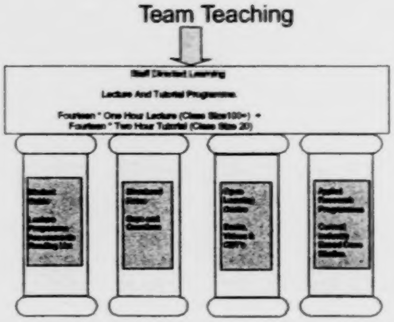
The idea of a globalised higher education sector - a 'global campus' - implies administrative, pedagogic, operational, and technical issues, and the Virtual Online University (www.tcet.unt.edu) offers an interesting metaphor for the learning 'cyberspace'. It is structured around a virtual campus, designated as a 'MOO' (an Object-Oriented Multi-User Dimension), around which students can wander as they would around a physical campus. At the same time, the range of courses offered remains very traditionally 'subject-based'. Is this appropriate to such a new learning environment?

Such an environment may well present a lack of unified focus for learners. Laurillard (1993) draws attention to the decentralising effect of new technology. She argues that this can push forward a very fragmented view of knowledge. This is opposed to, what she typifies as, 'academic knowledge', which has an integrative function different from simply 'knowledge'. It is this reflective aspect which is likely to prove difficult to deliver in the information model described by Dolence (1995). Learners in a virtual campus may well require a much stronger structural identity. It is, therefore, important that there is a strong conceptual platform that integrates and preserves a sense of intellectual and discipline consistency.

Local implementation

At a local level, we have attempted to incorporate such issues and challenges within a conceptual and pedagogic framework for the education of information engineers. A set of modules has been implemented within a conceptual framework entitled Systems, Techniques, Implementation, and Integration (STIMI). An outline of this is shown in figure 1 (The STIMI Progression). In stage 1, the concept of systems and systems thinking is introduced to students. This theme is elaborated in separate semesters in stage 2. The first emphasises the usual systems analysis techniques of process, data, and event modelling. Implementation within the context of Computer-Aided Production Management (CAPM) is combined in the second semester. By stage 3, management and management-information related issues are addressed by examination of strategic and operational planning aspects. The integration of 'islands of automation' within the context of manufacturing businesses is the prime concern of the postgraduate programme. This module is designed to enhance the learning experience of those continuing students who wish to pursue their studies at this level, together with providing a firm base for external students entering the programme from a wide range of industrial and educational backgrounds.


Business Planning Level
Subject Area
Course Stage
Operational Activities
Tactical Planning
Strategic Planning
Introduction To Systems
Systems Analysis Techniques
DFD's LDS ELH TickIT
Planning CAPM Implementation
Business Technology People Cost
Information And Management
Strategic and Operational Planning
Integration
The Integration of Manufacturing Busines By Database Systems
Stage 1.
Stage 2.
(Stage3.)
Under Graduate Programms
Post Graduate Programme


Team Teaching
Staff Directed Learning
Lecture And Tutorial Programme.
Fourteen * One Hour Lecture (Class Size100+) +
Fourteen * Two Hour Tutorial (Class Size 20)

The basis of delivery for the modules is illustrated in figure 2 (Support for Module Teaching programmes). A body of structured teaching material (linked and sustained by four pillars that rest on the STIMI conceptual foundation) has been developed to minimise duplication of content and to provide a common platform for delivery. Following Race (1989), this incorporates a range of techniques developed from Open and Distance Learning models, such as self-assessment questions and other developmental questions and activities consolidated within the text.

The particular problems of part-time students, those students beginning their studies at differing entry points, and students who require extra support are recognised, and are of especial relevance within the context of this paper. Such students have significant demands placed upon them by work and family pressures so such students can also access this material via the University web site. Open and distance learning material may appeal to university management because of its apparent cheapness, but such students are likely to require significant support mechanisms. They may be unfamiliar with the nature of independent learning implied by a higher education programme of study. How are such mechanisms to be implemented and managed given an electronic local campus, let alone a 'global campus'? Learner support in the global campus will rest upon two pre-requisites: learner support and technological delivery mechanisms. We will address the latter aspect later in this paper. For now, we wish to describe briefly some of the issues involved in supporting widely-dispersed learners. Such learners may well be dispersed temporally as well as geographically. The use of packaged material (CD-Rom, text-based and other resources) is the conventional means of handling knowledge content. But how can learners benefit from a shared learning experience? Romiszowski (1995) describes how a co-operative programme can be established, and can be extended by various Internet and Web-based technologies - bulletin-board conference facilities, email, links to resource materials (virtual museums, virtual libraries). All of these offer significant potential as an integrated collaborative platform.

Distributed learning

Such initiatives still, however, rest upon a traditional view of teaching and learning. The support of Distributed Learning paradigms should now be considered. Distributed learning is founded on the belief that the personal needs of the student are paramount. Academic institutions can evolve courses based upon modules (STIMI), that can expand choices for students whilst maintaining educational quality across location and time-bound constraints, as well as providing the student with a more self-paced, self directed, career-biased learning experience. A distributed learning environment can essentially be stand-alone with a single subject/operator or can be linked via with a common database and/or other systems into a distributed system/servers. The common database may either be held centrally (and modified if required by each system/server) or local copies can be used with changes highlighted to the other components of the system/network. For example, for a design engineer a distributed learning environment is desirable, but design engineers can be trained individually. For other learning contexts, it is mandatory, especially where teams of operators interact in command and control of resources. An example where a distributed environment would be mandatory is in Air Traffic Control where visualisation of air space needs to be accessed and controlled by many operatives.

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Technological aspects

One of the potential problems with distributed learning is data transmission rates over networks. Optical Fibre technology has developed such that within the near future transmission rates of 10 Gigabits sec^{-1} will be possible over broad band optical networks (Chan, 1995). A current or near term technology is the so-called "DVD" CD-ROM (Bell, 1996) where data is written to a multiple layer CD. This technology gives the CD-ROM the capacity to store up to 17 Gigabytes on a single disc with a data rate capacity of 11 Mbits sec^{-1}.

Such technologies (given development) are of direct relevance to Distributed Learning and its application, by affording a platform for the development of such teaching aids as Virtual Reality (VR). Given the inherent ability of VR to display three or multi-dimensional properties of objects to a operator its uses in teaching and training are virtually endless. It must, however, be remembered that VR is essentially only a display tool and therefore cannot fully substitute for other forms of learning. It is also important, given the growing importance and development of VR technology, that VR itself should be taught as a module at core level (STIMI). Being a multi-disciplinary subject it can only be taught at a relatively high level. It should however become a mandatory subject in all information technology courses even if minimum time is devoted to it (Elson, Simms [1997]).

Table 1 below lists some potential applications for VR in teaching. This list is not meant to be complete and many other applications may occur to the reader.

Table 1: Some Uses of VR in education

Subject	Use
Physics	Motion, Orbital Mechanics, Gas Physics, Multi-dimensional analysis
Chemistry	Structure of compounds, molecules
Biology	Structure of organisms, behaviour of organisms
Earth Sciences	Earth observation, landscape
Geography	3-D structure
Geology	Structure of fossils
Engineering	CAD/CAM
General	Display and analysis of multi-dimensional data

For basic tutorial type work the basic technology already exists with PC's and CD-ROM's. For more extensive use lightweight cheap helmet-type displays need to be available along with the appropriate computer technology (fast networks delivering M-Bytes $sec^{-1)}$

In conclusion then, the Global Campus is a rapidly developing field with many potential applications. It has direct application to teaching and training at many levels. Educators should be made aware of the capabilities and limitations of the technology. Distributed systems are required for its effective use. The concept of a Global Campus offers a useful metaphor for the delivery of a new mode of education, supported by fast and flexible delivery mechanisms.

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Information and Communications Technology: Teachers' and Students' Preconceptions and the Implications for Teacher Education

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Abstract: The authors have for some time been concerned with notions about *information and communications technology* (ICT). The term has only recently come into use in the UK, where *information technology* (IT), had been previously used. Elsewhere *IT* is still common as is *Telematics* or *Informatics*, even when the term is agreed there seems little consensus as to its meaning. Although there might be some agreement between teachers, the authors are not sure this extends to their students. Within the constructivist tradition, it is considered vital that teachers understand and take account of the preconceptions of students for successful learning to take place. Where no shared understanding exists, planned learning is unlikely to happen. This paper introduces a research project investigating the preconceptions of teachers and their students and, with reference to initial findings, identifies possible implications for teaching, particularly in the context of teacher education.

Definitions of ICT

The development of integrated circuits and in particular very large scale integration and microprocessors in the 1970s led to what has been widely called the second industrial revolution. In the early 1980s, the term *information technology* (IT) was being used to describe the resulting microelectronics-based computers and associated technologies. At this time, the newly developed microcomputers started appearing in schools, with peripherals and software. In the UK, in response to perceived challenges to competitiveness in microelectronics industries, government initiatives to support IT in industry and in education were launched. It was generally assumed that IT included computer hardware and software artefacts and functions but no single definition was dominant. In the UK a number of organisations and individuals gave their own definitions including, IT:

is 'the technology associated with the communication, storage and retrieval of data' (Chandler, D. 1984)

'includes matters concerned with the furtherance of computer science and technology, design, development, installation and implementation of information systems and applications' (San Diego State University 1998)

There are many more, but in particular from the UK central government education department, IT is:

'the technology associated with the handling of information: its storage, processing and transmission in a variety of forms by electronic means, and its use in controlling the operation of machines and other devices' (Her Majesty's Inspectorate, Department of Education and Science 1989)

'the use of technology to process information by the use of computers or electronic telecommunications' (Her Majesty's Inspectorate, Department of Education and Science 1991)

'the acquisition, production, transformation, storage, and transfer of data (information) by electronic means – in forms such as vocal, pictorial, textual, and numeric – so as to facilitate interactions between people and between people and machines. It also includes the applications and implications (social, economic and cultural) of these processes' (Mansell, J. et al 1987)

Even where definitions are published by the same organisation, then, there is not necessarily an agreement. Most definitions do include reference to microelectronic technology and its use in dealing with information (rarely differentiated from data), with varying degrees of detail. Since there is then no authoritative definition of ICT, for the purpose of this research the authors have taken the Further Education Unit (Mansell 1987) definition as a convenient starting point.

In UK education, in 1988 the National Curriculum for England and Wales was enacted. This included statutory Programmes of Study for IT Capability for all school students in maintained schools from 5 to 16 years, and Statements of Attainment for assessment and reporting learners' progression in IT Capability, which were published in 1990. The IT elements have been revised since (1995 and 1999) and now, termed ICT, include the definition:

'ICT is used to refer to the range of tools and techniques relating to computer-based hardware and software; to communications including both directed and broadcast; to information sources such as CD-ROM and the Internet, and to associated technologies such as robots, video conferencing and digital TV' (Department for Education and Employment 1999)

It is worth noting that the UK government has also introduced the statutory Initial Teacher Training National Curriculum for the use of Information and Communications Technology in Subject Teaching (Department for Education and Employment 1998a), relating to this definition of ICT. This includes discrete and compulsory *Expected Outcomes* in ICT for all students graduating after 1998. To accomplish the government's targets that 'serving teachers should generally feel confident, and be competent to teach, using ICT within the curriculum' and 'most school-leavers would have a good understanding of ICT' by 2002 (Department for Education and Employment 1998b), a major programme of continuing teacher education has also been established for practising teachers. This is based on published competencies by the Department for Education and Employment reflecting the initial teacher education expected outcomes and the published definition of ICT.

Meaningful learning

Ausubel (1968) used the term *meaningful* for learning that related to a learner's own constructed knowledge, indeed he considered 'the most important single factor influencing learning is what the learner already knows'. This sentiment certainly relates to classroom experience where teachers will generally agree it is much more effective to start 'where the student is' then move to new knowledge, skills and understanding than making inappropriate assumptions and see little learning. Driver (1983) undertook her highly regarded research in science education on this theme identifying the *alternative frameworks* students construct and, when in conflict with the framework the teacher intends communicating, prove a barrier to learning. She fully concurs with Ausubel's (1968) statement that 'preconceptions are amazingly tenacious and resistant to extinction', recognising the importance of the teacher understanding those preconceptions and designing learning experiences accordingly.

The authors see this as relating to teaching and learning in ICT. Although the issue of knowledge acquisition is less significant than developing skills and gaining understanding, it is as important that these are *meaningfully* developed, through a clear understanding of students' preconceptions. To gain some insight into the issue of alternative preconceptions a research programme was set up to discover what students (15-16 years old) understand by ICT. In addition, the same was attempted with teachers and initial teacher training students, for whom the research was extended to also find out what their expectations were of their students' preconceptions.

Methodology

It was considered inappropriate to ask subjects to define ICT since initial work indicated this would at best result in rote-learned definitions, students being well practised in giving teachers the 'right responses', that is those that the teacher wants to hear. This is no less true of teachers and student teachers. For the initial research then, a questionnaire was prepared asking subjects to identify items listed as examples of ICT by choosing *yes*, *no* or *not sure*. The items were chosen to reflect the preferred definition and to include examples of audio, graphical, textual and numerical media; acquisition, production, transformation, storage and transmission functions. The items for each included what the authors considered to be strongly, weakly and unlikely examples of ICT. For example, for audio transmission:

Megaphone
Radio
Mobile phone

were listed. In addition, items that did not fit into any one category were included, such as:

Internet
Automatic doors
Air-cushion trainers
Books

In all 90 items were listed, in alphabetical order. For teachers and student teachers, two lists were given one for their own responses, the other for their expectations of the response of a typical 15-16 year old. In addition, teachers and student teachers were asked to identify their own Gender, Main teaching subject, Age band (five bands).

The initial results discussed below come from:

314 student returns, 48 teacher returns, 36 student teacher returns

The students and teachers were asked to complete questionnaires in the autumn of 1999, the range of schools was selected to approximately represent the comprehensive education of males and females between 14 and 16 years old and in London, and includes single sex and co-educational schools. Approximately 20% of dispatched questionnaires were returned completed. Very few items were not responded to, blank returns being considered insignificant. The data received represents the first phase of a bigger project targeting receipts from up to 5000 students and 1000 teachers, and from that quantitative survey follow-up interviews will be undertaken.

The student teachers were post-graduates following subject-based programmes for teaching students of secondary school age (11-16 years). All attend one University in South London and were mixed in terms of age, gender and main teaching subject. This data was also collected in autumn, 1999. These represent limited samples for quantitative research, yielding only indicative results to which further, more substantial data sets will be added as the project progresses.

The initial analysis determined the degree of confidence each group demonstrated in choosing *yes* for each item, that is in considering the item *was* an example of ICT. This was calculated by comparing the proportion of *yes* responses to *no* and *not sure* responses giving a value of between +1.0 and -1.0 for each item. A band of confidence measures between +0.33 and –0.33 was considered adequate to cover confidences calculated from non-significant data, that is responses that could have occurred by chance alone. Values above +0.33 were identified as having high confidence as examples of ICT and probably representing a tacit understanding of ICT.

The data for each subject group was formatted as ranked lists of items (Tab. 1), although there was some clumping of rankings and the size of the differences in confidence varied the ranked lists are useful indicators of these tacit ICT definitions.

STUDENTS OWN	STUDENT TEACHERS' OWN	STUDENT TEACHERS' EXPECTATIONS	TEACHERS' OWN	TEACHERS' EXPECTATIONS
internet	*computer*	*CD-ROM*	answering machine	*Computer*
worldwide web	*worldwide web*	*computer*	barcode	*electronic mail (email)*
computer	cable television	*internet*	*CD-ROM*	*internet*
fax	*CD-ROM*	*worldwide web*	*Computer*	*worldwide web*
CD-ROM	*digital camera*	*electronic mail (email)*	credit card reader	*laser printer*
electronic mail (email)	*fax*	pocket television	*electronic mail (email)*	*spreadsheet*
word processor	*internet*	*scanner*	*fax*	playstation / games console
broadcast television	*mobile phone*	*word processor*	*internet*	*word processor*
answering machine	*word processor*	*digital camera*	*worldwide web*	*fax*
security cameras	broadcast television	*satellite television*	*digital camera*	*scanner*
satellite television	calculator	playstation / games console	heart-rate monitor	spell checker
mobile phone	CD player	*fax*	lottery terminal	*CD-ROM*
teletext	credit card reader	*laser printer*	*mobile phone*	LCD (computer screen)
barcode	*electronic mail (email)*	*mobile phone*	*satellite television*	projector
credit card reader	lottery terminal	cable television	*teletext*	*mobile phone*
cable television	public telephone	music sampler	*word processor*	*satellite television*
scanner	*satellite television*	radio	baby alarm	*digital camera*
heart-rate monitor	*teletext*	robot	burglar alarm	*teletext*
LCD projector	LCD (computer screen)	*spreadsheet*	cable television	credit card reader
spreadsheet	projector	*teletext*	cash card	barcode
laser printer	barcode		phone card	cash card
pocket television	radio		spell checker	lottery terminal
audio / music CD	speedometer		video editing suite	security cameras
spell checker	*spreadsheet*		pin number	
robot	traffic lights		pocket television	
radio	audio / music CD		*spreadsheet*	
traffic lights	answering machine		telephone redial	
digital camera	cash card		broadcast television	
CD player	cassette recorder		camcorder	
calculator	digital watch		cash till	
photocopier	hearing aid		LCD (computer screen)	
baby alarm	heart-rate monitor		projector	
public telephone	photocopier		playstation / games console	
burglar alarm	pocket television		security cameras	
	scanner		traffic lights	
	security cameras		public telephone	
	baby alarm		*scanner*	
	camcorder		CD player	
	cyberpets		digital thermometer	
	laser printer		digital watch	
	microphone		*laser printer*	
	music sampler		radio	
	spell checker		calculator	
	video editing suite		cyberpets	
	books		synthesiser	
	burglar alarm		audio / music CD	
	cash till		hearing aid	
	cassette tape		robot	
	central heating controls			
	morse code			
	phone card			
	pin number			
	telephone redial			
	train timetable			

Table 1: Ranked items chosen as examples of ICT with high (>+0.33) confidence (common items shown in italics)

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Subject group	*Items identified(/90)*
Students	34
Student Teachers own examples	53
Student Teachers expectations of Students' examples	20
Teachers own examples	47
Teachers expectations of Students' examples	22

Table 2: The number of items identified as examples of ICT with a high degree of confidence

Results

The numbers of items confidently chosen as examples of ICT varies considerably with a clear indication that teachers and student teachers include a wide range of items in their own definition of ICT while including a much smaller range in predicting student responses (Tab. 2).

Within the items identified by the data from each subject group there are fourteen items common to all data sets, these largely represent visual media with only one example each of sound (mobile 'phone) and numerical types (spreadsheet). The extent of this difference is not as marked in individual subject groups.

Conclusions

The data sets used are small and to some extent lack reliability, particularly in terms of validity, however they do indicate possible trends. The expectations of teachers' and student teachers' definitions of ICT thought to be held by students were very different from their own in terms of scope. In addition, they differ considerably from the students' actual choices that represent approximately, what one might expect (about 1/3 of items confidently identified as examples of ICT). There is some indication of underestimating students' understanding of the range and variety of ICT, and at the same time maintaining the very broad definition apparently held by their teachers. Although there is a core of common items selected, many more within students', student teachers' and teachers' definitions are not common across all groups, however mapping this core onto the selected definition shows all aspects to be covered in terms of examples. This does not in any way suggest the definition could be derived from the examples:

'the acquisition [*digital camera*], production [*laser printer*], transformation [*scanner*], storage [*electronic mail*], and transfer *[internet]* of data [*information*] by electronic means – in forms such as vocal [*mobile 'phone*], pictorial *[satellite TV]*, textual [*wordprocessor*], and numeric [*spreadsheet*] – so as to facilitate interactions between people [*fax*] and between people and machines [*teletext*]. It also includes the applications and implications (social, economic and cultural) of these processes' (Mansell, J. et al 1987)

A survey of items largely categorised as *not* ICT or *unsure* includes games console, lottery terminal (National Lottery device used to electronically enter the draw and transmit data which is held centrally), lottery lucky dip (generates random lottery numbers) and cyberpets. These are all relatively high profile applications and might have been expected to be chosen. Synthesiser and plotter were also largely in the *not* ICT choices. These lead to speculation about the subjects' knowledge of the named technologies or perhaps the fact that questionnaires were completed in educational environments led subjects to ignore ICT outside that context. This condition is reflected in published case studies where traditional ICT applications are related, almost exclusively, as examples of good practice.

Despite these speculations, the ranges of items included in subjects' choices indicate a generally broad perspective on ICT although this also includes a great deal of uncertainty. This indication of uncertainty causes some concern, not only regarding the points made above about the need to understand the students' preconceptions to engage them in effective, planned learning but also in terms of clarity in the planning itself when intentions are unclear.

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The indications outlined above emphasise the good practice of diagnosing the starting points of students, to inform planning for teaching and learning. This is perhaps less obvious in ICT education than in other, traditional and more knowledge-based subjects. Many of the definitions, particularly those promulgated by government departments, describe ICT largely in terms of tools to be applied elsewhere. It would be easy for a teacher to make assumptions about students' understanding while focussing on the application, possibly missing opportunities for students to also progress in their understanding of ICT. The other side of this is having inappropriate expectations of understandings and skills, obviating the achievement of any objectives or limiting the appropriate exploitation of ICT. For student teachers, these issues are compounded by their need to monitor and exploit their own uses of ICT. A first step in this might be to encourage student teachers to determine their own definition of ICT. By necessity, this will need to be flexible since the technology is continuously developing, as are individual relationships with ICT resources. Student teachers should also take advantage of time in schools to explore students' preconceptions, aspirations and situations in order to identify their needs and celebrate achievement. To understand their learners and to recognise the potential, both positive and negative, of ICT in their education, teachers and student teachers will need to share in students' perspectives on ICT and use or challenge preconceptions in a planned, considered approach.

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Promoting Collaboration in a European Context using Multimedia and the World Wide Web

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Abstract: This paper is a report on developments arising from the collaboration between a number of institutions and departments of teacher education under the European Commission SOCRATES programme. The background and aims of the developments involve the building of the "European dimension" through the use of multimedia and the World Wide Web into schools and teacher education institutions. In reflecting upon these developments in general terms, the role of telematics has played a crucial part in promoting communication, fostering the development of social relationships across the project team and facilitating the effects of synergy arising from this collaboration. Sustained and effective communication is seen to be the key to the success of such collaboration at all levels. A collaborative goal-oriented approach leading to purposeful activity can be seen as a common feature of the successful working of the project team, groups of student teachers and also pupils in schools.

Background and aims of the development

The EUROLAND project (1996-99) has been supported as an In-service training project under the Comenius 3.1 Action of the SOCRATES programme of the European Commission. It brings together partners from Austria, England, Finland and the Netherlands, in building the European Dimension into the curriculum of schools and teacher education courses (see also Hudson et al. 1997 and Hudson et al. 1999). The aim of the project is to develop the curriculum through the production of resources and teaching approaches with a cross-curricular focus at the upper primary/lower secondary school age range (8-14). The classroom resources are built around the use of a CD-ROM with simulations of and links to the World Wide Web. Teacher education institutions and departments lead the project in close collaboration with partner schools and teachers in each country. The resources that have been produced by the project have been used as the basis for the development of pedagogical approaches with teachers on intensive in-service training courses, which have been supported under the Comenius 3.2 Action of SOCRATES. They have also been used with students in initial teacher education via the SOCRATES European Module ECOSCHOOL (1997-2000). This project has been supported under the ERASMUS Action of SOCRATES that focuses on development in Higher Education. The content of the EUROLAND project involves the geography, history, economics, sights of interest and aspects of day to day life of the participating countries. Further it includes opportunities for the development of literacy, numeracy and ICT skills in problem solving contexts relevant to real life.

Nature of the resources and tools

The CD-ROM resources are used in an integrated way within the classroom with an emphasis on group work and discussion. Through this activity, it is intended that pupils gain increased knowledge of the capital cities and countryside of Austria, Finland, the Netherlands and England. It is further intended to provide opportunities to develop:

- information skills in the use of maps, charts, timetables and tourist information literature;
- skills of numeracy, literacy and ICT through problem solving activities in a European context;
- decision making skills in real life contexts and
- a wider awareness, appreciation and understanding of other countries and cultures in Europe.

Full use of the resources is intended to address the three aspects of *Information, Activity* and *Communication*. Students use their ICT skills to access *Information* from the CD-ROM and the WWW. They engage in problem solving *Activities* through the activities section on the CD-ROM. Further they develop their *Communication* skills through group discussion and also their wider communication skills by utilising possibilities to link to the World Wide Web and to make use of the EUROLAND Discussion Forum for example.

Users

Currently the resources are being used in a number of schools in Austria, England and Finland. The materials have been used also by groups of teachers from across Europe as the basis for development and evaluation as part of the Comenius 3.2 In-Service training action. Courses have been held in Linz in April 1997, in Sheffield in July 1999 and a further course will be held in Sheffield in February 2000. As a result of the recent course in Sheffield, a EUROLAND "chat day" is planned for January 2000 involving school students from Austria, Finland and the UK, with further participants expected from the other countries. In addition a videoconference was held in November 1999 between Oulu, Linz and Sheffield as part of the European Commission Netd@ys Europe initiative. The main objective of this initiative has been to familiarise participants with the possibilities of new media such as multimedia and video-conferencing, with priority given to supporting projects based upon educational content rather than to technology. The focus of this videoconference was a comparison of prices of different shopping items in the three different countries, which took its initial motivation from the EUROLAND section on "shopping".

The ECOSCHOOL project leads on from EUROLAND developments by focusing on web-based learning and communication. It is a potential means of students and teachers discussing their use of EUROLAND although the project is not entirely dependent on the use of the CD-ROM resources. Accordingly the ECOSCHOOL project has two aims:

- to develop learning by using the WWW and email across Europe, and
- to learn about the social and economic aspects of the participant's home city.

The resources and tools being used are university email communications and the resources provided by the ProTo environment at the University of Oulu – *Project Learning Tools on the Web*. This is an open learning environment that has been developed at the University of Oulu. Students can access the ProTo system via the World Wide Web. They have a password that allows them to create simple web pages and enter messages on a bulletin board.

The participants are primary teacher education students from Linz and Sheffield together with students on an international teacher education course at Oulu. A more recent partner to this development is the University of Darlana in Sweden. This has led to the participation of a group of social studies student teachers from Falun in Sweden.

Theoretical framework

The pedagogical approach underpinning the EUROLAND development is strongly influenced by a socio-cultural communicative perspective, as outlined in Hudson (1998, 1999). This approach is underpinned by the notion of *Activity* whereby students are engaged in purposeful tasks that can involve group work, discussion, problem solving and the use of ICT. Some of the activity is computer-based whilst some is away from the computer. A full and active role for the teacher is envisaged that involves the introduction and structuring whole class activities, monitoring group activities, intervening with individuals and small groups and drawing the class together in whole group discussion where appropriate. The role of the teacher in a technology rich classroom is discussed more fully in Hudson (1997). The open-ended nature of the resources enables use by students across a wide range of capabilities.

The European Dimension

A key aim of the project has been to promote the European dimension and the use of ICT in teacher education across Europe. The design of the material and the pedagogical approach has, therefore, been developed to accommodate implementation and wider development.

Phase one developed the foundation for the project by focusing on resources for Austria. At the time of writing, the Finland section is practically completed and work is ongoing on the UK section. The CD-ROM contains content-based information with Web links, teacher's notes and classroom activities. The Web site provides information about the project and is the basis for evaluation activity and further development of the communicative aspects of the project. The first version includes multilingual audio tracks on the CD-ROM (English, Finnish, German and Dutch) and corresponding versions of the evaluation forms. The final phase of the project will involve the implementation of appropriate sections of the material in the languages of the partner countries.

Example of use

Links to the Web have been incorporated and a Web site for the project has been established. The Web site includes both EUROLAND and ECOSCHOOL forums. The former has been used mainly by teachers and pupils in participating schools whilst student teachers have been the primary users of the latter. This section of the paper gives an account of how the ECOSCHOOL project has developed in particular.

Initially students in each country worked in collaborative groups to produce a short illustrated report on one of the following aspects of their home city. This involved:

- a general description of the city;
- the environmental situation of the city;
- the employment structure and opportunities within the city;
- the regional or national education system.

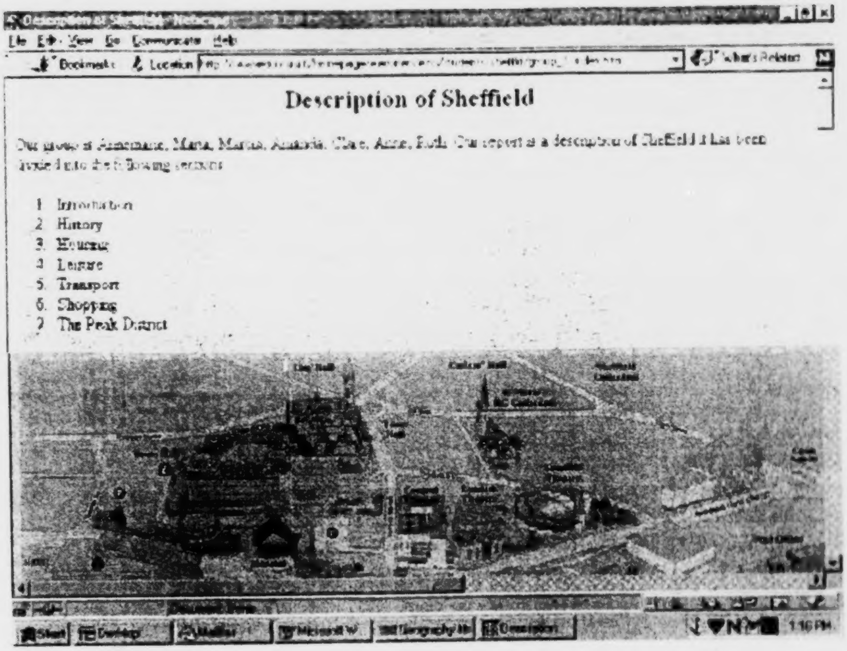
Subsequently they presented these reports as web pages by writing them in to the ProTo learning environment. Figure 1 shows a page produced by the Sheffield students.

They also emailed their work to other students in the partner countries who were presenting the same topic. Once all web pages were complete, they read their partner's pages, asked questions and made comments about them on the bulletin board.

Each group evaluated their work using the same criteria designed by the tutors in each country. The tutors then read each group's pages, assessed the pages and provided feedback to the each group. The students' work was assessed against the criteria and graded A to C. The tutors posted written feedback on the bulletin board.

Three cycles of the ECOSCHOOL project have been completed; one is in progress at the time of writing. Figure 1 illustrates an example from the first cycle in which each group of students presented their own home city.

Figure 2 is an illustration of the activity in the second cycle. The aim of this round of co-operation was for students to share lesson plans and teaching ideas. Each group of students planned lessons with the aim of children learning more about their local town or city.

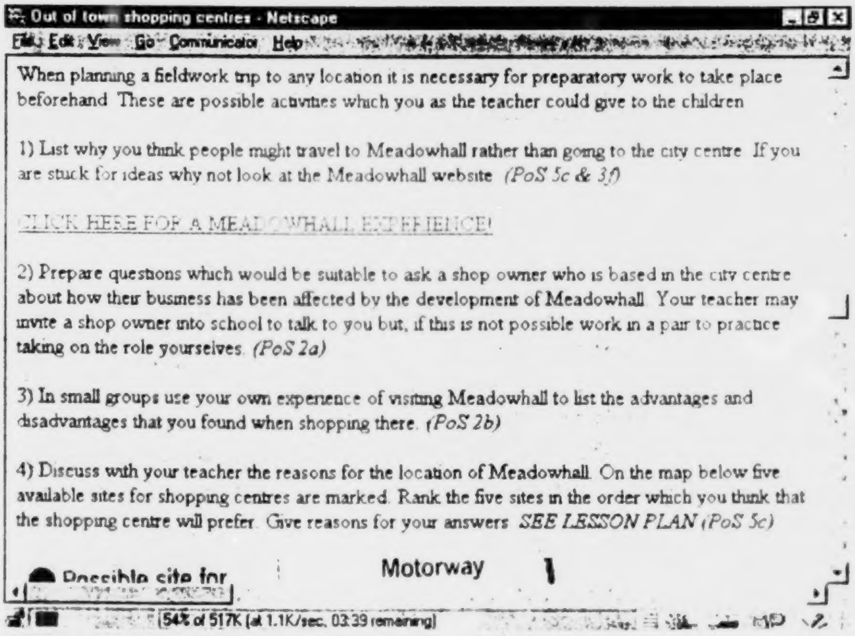

Description of Sheffield - Netscape
File Edit View Go Communicator Help
Bookmarks
Location
What's Related

Description of Sheffield

Our group is Annemarie, Maria, Marina, Anastasia, Clare, Anne, Ruth. Our report is a description of Sheffield. It has been divided into the following sections

1. Introduction
2. History
3. Housing
4. Leisure
5. Transport
6. Shopping
7. The Peak District

Figure 1: Work from the Sheffield students posted to the ProTo learning environment.


Out of town shopping centres - Netscape
File Edit View Go Communicator Help
Motorway
[54% of 517K (at 1.1K/sec, 03:39 remaining)]

When planning a fieldwork trip to any location it is necessary for preparatory work to take place beforehand. These are possible activities which you as the teacher could give to the children

1) List why you think people might travel to Meadowhall rather than going to the city centre. If you are stuck for ideas why not look at the Meadowhall website *(PoS 5c & 3f)*

CLICK HERE FOR A MEADOWHALL EXPERIENCE!

2) Prepare questions which would be suitable to ask a shop owner who is based in the city centre about how their business has been affected by the development of Meadowhall. Your teacher may invite a shop owner into school to talk to you but, if this is not possible work in a pair to practice taking on the role yourselves. *(PoS 2a)*

3) In small groups use your own experience of visiting Meadowhall to list the advantages and disadvantages that you found when shopping there. *(PoS 2b)*

4) Discuss with your teacher the reasons for the location of Meadowhall. On the map below five available sites for shopping centres are marked. Rank the five sites in the order which you think that the shopping centre will prefer. Give reasons for your answers. *SEE LESSON PLAN (PoS 5c)*

● Possible site for

Figure 2: Teaching and learning about Sheffield

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Evaluation

Evaluation has been an ongoing aspect of this development and has been built in as an integral part of the developmental process. Feedback has been gained from teachers involved in the in-service courses; teachers and pupils involved in classroom trials in the pilot schools and students on initial teacher education courses. The project Web site has been designed specifically to facilitate on-line evaluation. The evaluation of the use of the EUROLAND CD-ROM can be carried out in English, German, Finnish or Dutch.

With specific regard to the ECOSCHOOL project, the analysis of evaluation data for the first cycle shows that the students developed their ICT (Information and Communications Technology) skills and confidence during the project. The majority of students in all counties reported that they had linked well with their partner students by email and by using ProTo. A key issue was the demand for academic credit for their work, as this project was not assessed as part of their degree programme. The students who took part were motivated and enjoyed the process. This is significant and positive point as all the students had limited ICT skills at the start of the co-operation and many students viewed the creation of Web pages with some anxiety.

Evaluation of the second cycle revealed that communication between the students was not as frequent as in the first cycle. Reasons given for this lack of communication included the 'interruption' of the project by school teaching practice in the UK and Finland, and that students spent more time on constructing their own pages than communicating with their partner groups. This time the work formed part of an assignment at Sheffield Hallam University so the students received credit for the design of their Web pages and for the production of a report concerning the project. This pressure of assessment had two effects; it satisfied the students in the demand for academic credit, but it also reduced the importance of informal communication between the groups.

The ECOSCHOOL project has involved the use of ICT appropriately to support environmental and social learning. It has been successful in terms of developing ICT skills, subject knowledge and has provided the opportunity to compare different approaches to teaching and learning across the European Union. Sustained and effective communication is the key to such a project. This can be elusive and an important finding from the evaluation process is that placing too much focus on producing the resources can hamper communication.

Primary and secondary schools in the UK are now being connected to the National Grid for Learning and students need the skills and pedagogic understanding to use ICT as a medium for European and global communication. The ECOSCHOOL project has prepared teacher education students for developing communication projects when in school. One student has already set up a similar project whilst on teaching practice. In this example infant school children communicated via email with children in Bermuda and compared their localities, hobbies and homes as part of English and geography learning.

Discussion

The ECOSCHOOL project is running during the autumn 1999 with several new developments. The students are in internationally composed groups rather than from one single country; the focus of the project will be to choose an educational problem and present a solution to this by co-operating and communicating using ICT. The students can use email, create their own web pages, use ProTo2 (a more sophisticated version), or use the EUROLAND bulletin board at http://www.shu.ac.uk/services/lc/cmeweb/euroland/dgroups.htm.

It is timely to reflect upon the overall aims and objectives of the SOCRATES II programme of the European Commission which is the programme that is currently being phased in to replace SOCRATES I. This places the emphasis on lifelong learning as a means of fostering active citizenship and enhancing employability. The objectives contain many elements that can be seen to be very relevant to the experience of the project team with regard to the developments outlined in this paper:

- To strengthen the European dimension in education at all levels and to facilitate wide transnational access to educational resources in Europe while promoting equal opportunities throughout all fields of education;
- To promote a quantitative and qualitative improvement in knowledge of the languages of the European Union, in particular those languages which are less widely used and less widely taught, so as to lead to greater understanding and solidarity between the peoples of the European Union and promote the intercultural dimension of education.
- To promote co-operation and mobility in the field of education, in particular by:
    - encouraging exchanges between educational institutions,

- promoting open and distance learning
- encouraging improvements in the recognition of diplomas and study periods,
- developing the exchange of information,

and to help remove obstacles in this regard.

- To encourage innovation in the development of educational practices and materials and to explore matters of common policy interest in the field of education.

In reflecting upon these developments in general terms, the role of ICT, multimedia and the WWW or (more concisely) telematics has played a crucial part in fostering communication, facilitating the development of social relationships across the project team and also the effects of synergy arising from this collaboration. A core group of partners involved in these developments began their collaboration in the autumn of 1994 around a shared interest in environmental education and supported by the European Commission as a network, which met just twice a year. The communication between meetings consisted of fax only at that time. The transformation that has taken place since then owes much to the effects of telematics in fostering communication between project members and facilitating the current level of collaboration which has the potential to develop much further.

The successful synergy effects can be seen in the level of teacher and student exchanges between the partners and the level of joint teaching, curriculum development and evaluation and increasing levels of research and international dissemination activity.

Sustained and effective communication is seen to be the key to the success of such collaboration at all levels. A collaborative goal-oriented approach leading to purposeful activity can be seen as a common feature of the successful working of the project team, groups of student teachers and also pupils in schools. The role of telematics has been crucial to achieving this stage of development.

We believe that we have learned a great deal collectively from our experience and that there is enormous potential for further development. We hope that we have something to offer others who are interested in learning from our experience and look forward to benefiting from wider responses to our dissemination activities.

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TOWARDS A NEW CURRICULUM FOR PRE-SERVICE TEACHER EDUCATION: A RESPONSE TO THE CHALLENGE OF THE INFORMATION AGE

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Abstract: The information age challenges pre-service teacher education to change rapidly. This is the result of the catalytic impact of technology on the changes in society at large, and consequently on the changes in the role of learning and teaching in society. Therefore the challenge is not only that prospective teachers need to acquire the knowledge and skills to use Information and Communication Technologies (ICT) in education, they also need to learn a new approach to teaching and learning. In 1997 a national contest in the Netherlands challenged all Colleges of Education to put forward a proposal for the development and implementation of a new approach to teacher education, reflecting the needs of the information age. As a result two Colleges attained the status of 'Experimental College of Teacher Education'. In the four contributions of this panel the vision on education and the implementation after two years of experience are shared.

Curriculum Innovation between Care and Courage: National Curricula and Innovation Strategies in the Netherlands

In November 1996 a Dutch ministerial committee published a report about the transformation needed in education to meet the demands of the 21st century. The changes that are taking place in society are

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characterized as a transformation from an industrial society to an information society. This transformation influences all levels of society and will have enormous impact on education. However, the consequences of this transformation can not be predicted, because the future is yet unforeseen. It is fundamentally impossible to foretell what new ways of education there will be in the future and the only senses we have are for today. This transformation requires a process of change in education of which the outcomes are unknown. According to the committee two parallel strategies are necessary to move from the old, present-day situation to the new situation. These strategies are characterized by the words 'CARE' and 'COURAGE':

- CARE for the existing system: how can we make innovations in the existing system, taking care of the present-day students and schools.
- COURAGE to start experiments that will give some outlook into the future: exploring new ways, new technologies, new methodologies.

A crucial factor in the dilemma of the combination of CARE and COURAGE is the extend to which the innovation of teacher education is based on explicit ideas about the future of teacher education. Often, the changes in the policy and regulations from the government are brought forth by problems in the present-day system and not explicitly by ideas about how society is changing and what the consequences of these changes are for education.

These two approaches of the innovation process should be really complementary: together they create a change process that is both realistic and innovative and in which teacher education institutions are able to innovate their curriculum along different routes at different speed according to the local situation and their potential for innovation.

Since 1996 both the CARE-line and the COURAGE-line have been present in two major developments concerning curriculum innovation in teacher education in The Netherlands:

1. The Minister of Education started a process to develop a 'national curriculum' for teacher education;
2. The Minister started a program on the implementation of information and communication technology in teacher education.

CARE: A National Curriculum

A national Process Management developed a project plan, in which they described their main aims to improve teacher education: Curriculum innovation: development of common curriculum guidelines and teaching goals for primary teacher education and secondary teacher education; Regional co-operation between the institutions for teacher education; Professional development of teacher educators.

In March 1998 the national curricula for primary teacher education and that for secondary teacher education were published. The underlying assumptions in the national curricula about 'good' teaching and learning and teacher education are that teaching is a pedagogical process and that good teachers are able to reflect upon themselves and the teaching situation in order to improve teaching and learning.

The curricula exist in three parts. The first part is the introduction to the national curriculum. The second part consists of quality standards that each institution for teacher education has to meet. These standards give an indication about the quality of the curriculum that must be developed on an institutional level, and give institutions a lot of freedom and responsibility in the actual translation of a national curriculum into a institutional curriculum. The third part of each of the national curricula contains the teaching goals for the general pedagogical part of the curriculum and for each school subject.

The national curricula mirror the existing views on teacher education in The Netherlands. They are important tools in the discussion about teacher education because they present a general view on teacher education, quality standards for all institutions for teacher education and general and subject related teaching goals that can be used to assure the quality of teacher education in The Netherlands. In this respect the national curricula represent the CARE-line.

COURAGE: Innovative projects, the experimental teacher education program and research

In answer to the committee-report the Minister of Education started a program on the implementation of multimedia and ICT in teacher education in June 1997. The main aim was to stimulate the integration of the use of ICT in the curricula of teacher education. This was done by challenging the institutions to start projects and experiments based on new teaching methods, combining CARE for the existing practice and COURAGE for new way of educating teachers. In this way new 'emergent practices' evolved. These emergent practices in which ICT is used, will fit with the new ideas on education, in which concepts like active and self-responsible learning, problem-based learning and learning strategies play a central role. The program contained several elements: Institutional projects, Experimental teacher education program, Development of new educational software, Research on and monitoring of the use of ICT in (teacher) education, Regional centers of learning technology.

After a contest two institutes were designated to host an experimental teacher education program. The Ichthus Hogeschool Rotterdam conducts an experiment on a restricted base (elementary schol level, with each year an increasing number of students involved). The Amsterdam Faculty of Education, on the other hand, is transforming a whole large faculty that provides for 4000 students. In this SITE-panel both experimental teacher education programs are represented, together with people who conducted academic research during the development and implementation of the new programs.

The Courage-line and the Care-line have been separate developments in the period 1996-1998. The most important difference is the perspective: while the Care-line focuses on the system of today, the Courage-line focuses on the demands that the rapid changes in society place on education. This separation between both lines can be seen as a necessary phase in the innovation of teacher education. To start a transformation from present-day teacher education to teacher education for the future, it is necessary to have consensus about what good present-day teacher education is. By taking the initiative to develop a national curriculum for teacher education the government has defined the starting point of the transformation of teacher education towards the demands of the information society.

The simultaneous implementation of the national curricula and the Courage-program also has its problems. If emerging practices and experiments on new ways in teacher education have to fit in the national curriculum, within today's system of teacher education, the innovation is limited. When the experiments have to exist within the boundaries of the existing system, the existing educational model and the existing practices of assessment, it is impossible to really discover the possibilities the future has to offer. This is the challenge where the two experimental teacher education colleges have to cope with in implementing their visions and ideas of a new curriculum. After all, Care for the existing must lead to Courage for the new.

The Education of Teachers: A Change in the Concept of Curriculum is Needed

The Amsterdam Faculty of Education, which attained the status of "experimental teacher education" in the Netherlands through a national contest in 1997, is developing and testing a new curriculum concept for professional education, focused on meaningful learning. Education should reflect the way a professional works. This means that students, like professionals, work together on complex authentic tasks, and take control and responsibility with respect to their work, their learning processes and the way they will prove competence. In this concept, nicknamed "learning through producing", we integrate ideas on authentic learning practices, first-order and second-order learning, integrative assessment and electronic web-based portfolio systems. ICT is not used as an add-on technology, but the technology plays a role as catalyst of the curriculum transformation in the same way it induces changes in society. In our view, this new type of "dynamic" curriculum meets the needs of professional education in the information age.

Core Characteristics of the Experimental Teacher Education Program

Capable of managing change: Teacher Education should adequately prepare students for their profession in a largely unknown future. We cannot predict what that future will be like. However, what we do know is that in the decades to come there will be an increasing demand for professionals who are capable of coping with change and who can shape education in the information society – not only because teachers must be able to react quickly to changing circumstances in their teaching, but also because learning paths, in part due to rapid developments in information and communication technology, are becoming increasingly individualized. This does not necessarily mean, however, that learning is an individual activity. For teachers, this means that they, above all, as experts in guiding learning processes, must be able to shape their own learning processes.

Responsible Students: The program should offer students an environment in which they are indeed given the opportunity to shape their own learning processes. For this, students need to be given responsibility and they need to accept it - responsibility not only for the way in which they acquire the (constantly changing) competencies they will need in professional practice, but also for the way in which they demonstrate to the outside world that they have indeed acquired these competencies. To this end, at an early stage, the program offers students an environment that mirrors professional practice. In that environment, acting responsibly is related to real working situations. We view the program as a collection of facilities which students use to take responsibility for realizing their learning processes.

Freedom: In this environment, students have a considerable degree of freedom in filling in the details of their own learning processes. Our program operates in a context in which the requirements for newly qualified teachers are stipulated by law. This means that, although students should be given the opportunity to create their own learning paths toward becoming adequately qualified, we wish students to demonstrate to us, through integrative moments of assessment at three points in the program, that they have acquired the competencies they need to be admitted to the next phase. This view is in contradiction with the dominant view in education, namely that under the direction of the institution offering the program, the road to becoming a competent and qualified teacher consists of parts of a curriculum that have been determined in advance, and that evidence of competence is synonymous with the successful completion of those parts of the curriculum.

Dynamic Curriculum: Given the goal of our experiment and our view of teacher training, the current static curriculum needs to be made more dynamic. This is necessary because:

- Students must have the freedom, in consultation with their mentor, to shape the learning processes they feel are necessary to acquire the required competencies;
- Students must have the freedom themselves to organize the evidence they wish to present at the integrative moments of assessment;
- The program must have the freedom to be able to anticipate and react quickly to changing circumstances in society. In fact: the program itself must also be capable of quickly coping with change.

Authentic Learning in Professional Education: At as early a stage as possible, the program should create an environment for students which mirrors professional practices. Learning during the program must be linked as far as possible to useful and responsible work resembling work in the profession for which one is being trained. In professional practice, teachers have to carry out relatively complex tasks that fit in with the objectives of the school. To be able to do this useful work well, they must be able to use 'two kinds of learning'. They should not only be able to acquire on their own initiative the knowledge and skills they need to do their job well (learning of the first kind), but they should also be able to continue to learn from the experience gained and to experiment systematically with actions leading to improvement or change (learning of the second kind).

Both kinds of learning are important in the concept of 'lifelong learning'. Both are 'guided' by the competencies, which the competent and qualified teacher must have. The program offers an environment in which students can (and indeed should) put these two kinds of learning into practice in order to acquire the skills required for the profession.

Each learning process the student goes through in that environment consists of the phases of orientation, planning, execution and evaluation, and is guided by the competencies derived from the professional profile.

Assessment: For students this means that, in their orientation with respect to the learning and working process, they take the competencies they need to acquire as their point of departure. In doing so, they are aware of the fact that at a later stage, during the assessment, they will have to demonstrate that they have actually acquired the required competencies using their portfolio. On the basis of that orientation, they formulate concrete learning goals and activities (plans), subsequently work on useful products in a learning environment created by the program (execution), and, finally, they evaluate the degree to which those activities have contributed to the realization of their learning goals and the acquisition of competencies. The assessment of a teacher's work is – if all is well – based on the degree to which the teacher's work has been useful in aiding the achievement of the school's objectives, and on the teacher's ability to make improvements and cope with change. This assessment is therefore not based on disconnected knowledge and skills. Since the program is intended to mirror professional practice, it includes at three points in about four years time an integrative assessment based on competencies. During these assessments, students must show that they are qualified to take the next step: first to be admitted to the main phase, then to enter the assistant teacher phase, and, finally, they need to show that they are competent and qualified to start a professional career. The student's admission to each phase depends on the outcome of these integrative moments of assessment, which are in that sense decisive and final. During these integrative moments of assessment, students demonstrate individually to a small committee (consisting of people from within the institution and from outside) that they have reached a level of development which is at least that required. They also show how their growth in acquiring competencies has progressed so far. As proof of their growth, students must compile a 'showcase' from their portfolio containing results of their work and studies, including judgements made by others. In principle, students are thus made responsible for proving their own level of competence, measured against externally specified criteria. This is also in accordance with the procedures followed in professional organizations and professional practice. Our traditional, static curriculum only offers students sufficient freedom to take responsibility in the execution phase of learning processes. In the educational environment we have in mind, students will be expected to take responsibility in all phases.

Program facilities in relation to learning processes: The program environment consists of a number of facilities which students may use in taking responsibility for achieving their processes of learning and gathering evidence of competence. It is this change in the concept of "curriculum" that is meant in the title of this contribution.
The facilities can be categorized along the circle of orientation, planning, execution and evaluation. They consist of a set of competencies, an assessment procedure, a web-based portfolio system, lots of authentic learning practices, a continuous line of metacognitive work and a demand driven set of resources of knowledge and skills. More about these facilities can be learned about at other SITE 2000 contributions, e.g. on Integrated Assessment, Learning Practices and Web-based Portfolio System. Also the Website of the Amsterdam Faculty of Education is a source of information for this purpose: www.efa.nl

Realizing New Educational Concepts Using New Technological Possibilities

The Explo project of Ichthus University - Department of Education aims to train elementary-school teachers who have both vision and skill in handling ICT. Explo is a new, experimental teacher-training program, related to the Dutch government's Prommitt program (Program on Multimedia in Teacher-Training). Reflecting the program's *experimental* nature, the name Explo stands for Exploration, particularly the exploration of new educational concepts combined with new technological possibilities.

The curriculum's educational principles

Explo's objective is to train learning professionals. Thus, it is important for the program to train students to learn-as-they-work. We achieve this through both the in-school and outside-of-school curriculum. An important aid here is the multimedia portfolio, helping students to learn how to react to their working and learning experiences.

Learning how to think, learn and work independently: Students engage in learning activities to achieve certain learning objectives. They decide for themselves which learning activities to undertake. Nobody can take a student's place in learning, and there will be no learning results without learning. That is why, in Explo, we expect students to actively control their learning guided by their learning styles, learning concepts, knowledge, learning motivation and learning abilities, likewise guided by their experiences in interacting with education. Two consequences result from this view. First, we endeavor to teach students how to learn, think, and work independently. Hence, we see to it that students' learning, which initially is more program-controlled, gradually becomes more student-controlled. Tasks that were initially performed by lecturers are gradually taken over by students, such as selecting learning objectives, planning learning activities, the application of knowledge, monitoring progress and even evaluating the results. Secondly, learning to think, learn and work independently means a change in the tasks and roles of lecturers. They now pay rather more attention to the way students learn, they challenge students to start controlling their own learning process and help them to develop their "meta cognitive skills". The entire learning process is recorded as much as possible in a (multimedia) portfolio, in which students report their experiences in images, sounds, products and statements. Moreover, the study program is arranged so as to allow students to set their own speed in following their own learning routes.

View of learning:
Increasing self-control
in learning
View of teaching
Emphasis on guiding the
learning process

Learning how to think, learn and work independently

Links between theory and practice: Explo's system of instruction is determined by the link between theory and practice. The world of employment is the principal standard for the selection of learning objectives and program contents. Here, we are guided not only by the world of work and by theory, but also by individual students' subjective concepts. They consist of the values, opinions, convictions, ideas, principles, rules, guidelines and expectations that students have regarding education and those developed during the course of the program.

Practical work: In a professionally oriented program, students are prepared for work through internships as well. In Explo, we use the following lines of development to learn how to work as professionals:
a) From observation to education;
b) From working with a few children to working in a combined class;
c) From standard education to special education;
d) From performing a single teaching skill to giving a series of connected lessons;
e) From giving a lesson to a whole class to developing differentiation within a class;
f) From performing internship assignments set by lecturers to performing tasks based on students' learning questions and planning;
g) From teaching a single subject or several subjects under the guidance of a mentor to functioning independently as a class instructor for a few days a week.
Both in the internship school and in the learning environment of the program students are expected to learn from each other. We encourage this through the joint preparation of internship assignments, attending each other's lessons in the internship school and offering practical examples from internships during lessons and modules.

Links between subject areas and fields of training: The program's point of departure is the professional qualifications for novice teachers. We distinguish the teacher as: (a) a professional, (b) a didactician, (c) an educationalist, and (d) as a team member and colleague. Since the teaching skills of novice teachers require a subject-related content, we start from the subjects that must be taught under the Elementary Education Act. In addition, we base the program on the starting-level requirements and the recommendations of the Process Management in Elementary-Education Teacher-Training Programs memorandum. Since we also assume that elementary-school teachers must be generalists, each program term has its central theme matching the students' development as much as possible. This theme forms the framework for all multidisciplinary and discipline-related tasks that students work on.

Study counselling and student counselling: Study counselling involves the development of students into learning professionals. Here, lecturers pay special attention to the way the students structure, regulate and assess their own learning processes. Student counselling involves a student's personality development and his or her cultural and social performance. One important object of counselling is that students develop a personal work concept. Several persons provide counselling: a) the phase-coordinator provides information about the program structure, b) the tutor provides counselling regarding the learning process students go through in their in-school and outside-of-school curriculum and c) the internship school mentor deals with day-to day student counselling, in particular students' practicing of skills and the performance of assignments.

ICT in education: vision and skill: In Explo, the development of views and skills is not an isolated activity, limited to any one subject, component or theme. It is an integral part for all components of the curriculum. In Explo, we wish to train teachers who: learn-as-they-work and are innovative, function in a multi-cultural and international environment and in doing so use ICT with vision and skill.
In Explo, five uses of ICT derive from this mission. ICT serves as:

1. A link between learning-as-you-work in practice and learning-as-you-work during coursework (the Internet);
2. An aid in providing adaptive education in elementary schools in a multicultural and international context (multimedia software, the Internet);
3. A means for students to develop vision and skill in the use of ICT in education: "being digital" (a laptop as a mobile toolbox for daily use);
4. A motor for lecturers and students to be innovative colleagues in designing (digital) learning environments (the Intranet to share knowledge);
5. A hub for the exchange of knowledge (website, electronic discussion platform) and to maintain the organization's external contacts (e-mail).

Technology Rich Learning Environments in Pre-Service Teacher Education: Implementing Ideas in Practice

One of the core characteristics in the changes towards a new curriculum for pre-service teacher education deal with the notion that prospective teachers need to be able to design learning environments in which learners are able to accomplish authentic tasks. In pre-service teacher education programs these authentic tasks often consist of the realization of concrete products which could be used in educational practice. Important features of such learning environments are that a) curriculum content is not offered separately but derived from the authentic tasks and attuned to students' needs, b) students get responsibility for their own learning and c) teachers guide and facilitate the learning process of students. In short these characteristics reflect present ideas in education such as constructivism and situated learning.
Technology can facilitate the realization of these learning environments in several ways. It can serve as means of communication between students and teachers (e.g. e-mail, CSCL) and as source of information (WWW). Technology can support the curriculum organization and learning process (e.g. digital learning environments, electronic portfolio). Finally students can develop digital products as an authentic task.

In the two experimental colleges of teacher education in the Netherlands a variety of such learning environments are part of the pre-service teacher curriculum. In the Amsterdam Faculty of Education these learning environments are referred to as Learning Practices. Learning Practices are one of the main parts that constitute the dynamic curriculum. The Ichthus' Faculty of Education has realized a cooperative project with elementary schools. Within this setting elementary schools implement innovative projects using ICT and pre-service students support the elementary schools in the realization of their project. The following examples represent two typical innovative learning environments.
A multimedia database for history teachers (Amsterdam Faculty of Education): The toolbox of a history teacher is a database of resources (video- and audiotapes, pictures, texts) on historical events together with student activity sheets and lesson plans. Pre-service history students are jointly developing such a toolbox in a digital format. The toolbox will be used in their internship program. Each student has to prepare 25 contributions to the database, share them with peer students and teachers and evaluate as a group the quality of the contributions. The students apply a number of ICT skills in realizing the database.
'A view on the world' in the Kindergarten class (Ichthus 'Faculty of Education): Pre-service students in the elementary teacher training program cooperate with elementary school teachers in a project for the Kindergarten. With the help of a digital camera and PowerPoint children, teachers and pre-service students are jointly developing an interactive picture book about the process of milk production. The pre-service students have the expertise on the use of technology, the teachers have their didactic experience and the kindergarten students put their curiosity and creativity in the project.

The role of formative evaluation

Formative evaluation activities are being conducted to guide the process of development and implementation of these new learning environments in both experimental teacher education colleges. The starting point of the evaluation is a conceptual framework, which reflects characteristics of innovative practices using technology in education (Voogt and Odenthal, 1999). This framework has been fine-tuned to the specific characteristics of the innovative learning environments as they are defined in the two experimental colleges of teacher education respectively. In both sites the formative evaluation aims at 1) sharpening the educational concepts and ideas which the learning environment intend to reflect, 2) contribute to a sound implementation of the learning environment in practice and c) description of the learning environment with a view to transfer of experiences. In the evaluation data (document analysis, interviews, observation) are collected to trace discrepancies between the intended curriculum (the educational concepts and their translation into curriculum materials) and the implemented curriculum (the realization in practice).

The formative evaluation points to the following concerns in the implementation of innovative learning environments:

- Educational concepts, such as 'self responsible learners' are not yet clearly elaborated in the learning environments. Students' are not always ready to take their responsibility and the instructors' repertoire is often insufficient to guide students in their learning process.
- The use of technology is not yet part of the routine of instructors and students and is therefore time consuming.
- The development of learning practices often starts from creative ideas of the teaching staff of the colleges of education. However, the organization of a curriculum through well defined learning environments cannot be based on creative ideas only, but requires also an appropriate blend between the competencies that students' need to acquire and the competencies that are dealt with in the learning practices.
- Pre-service students supporting schools in realizing examples of innovative use of technology have to deal with the outdated technological infrastructure in many schools.
- The elementary schools involved in the cooperation with the teacher education colleges have a very different experience in the use of and vision on technology. It implies that pre-service students cooperating with the elementary schools need not only to bring their expertise to the schools, but also need to become sensitive to the innovation process itself.

In the presentation these results will be presented and the implications for the further development and implementation of learning environments will be discussed.

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Preparing Student Teachers to Use ICT at Secondary School: A Course Designed at the University of Zuerich

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Abstract: Our two-semester course has been developed over several years. We specifically try to prepare student teachers to use information and communication technology (ICT) in their future work in the classroom. Thereby we are faced with three major difficulties: – the broad spectrum of subjects students have studied and will teach, – differences in the pre-knowledge and the pre-skills students bring with them, – most students have gained their own learning experience in classic lecture situations which are not compatible with a technology-oriented context. This paper will show how we try to overcome those difficulties. Our current course design is based on a learner-centered approach and combines different learning styles. In the first semester, our students work in independent groups following a guideline sheet. During the second semester, students create their own projects where they integrate ICT into classroom situations.

Introduction

Compared to America and most European countries Switzerland is very small. It has less than 3% of the inhabitants of the USA yet is composed of 26 cantons, which are autonomous concerning schooling. Hence many different school systems exist. However, we will only consider the situation of the canton of Zuerich in the north-eastern German-speaking part of the country. Secondary school are of two types. Most students (nearly 80%) attend normal secondary schools and after 9th grade leave school and start an apprenticeship. Only the remaining 20% go to grammar school and after the 12th grade will pass the final examination (called "Matura" in German), which is required to enter university. The following paper deals only with pre-service education of grammar school teachers. They have to acquire a first degree; afterwards they go through teacher education, which also takes place at the university. As a result, grammar school teachers teach only one, possibly two, subjects. Our two-semester course has been developed over several years and we have continued to adapt it to correspond to the evolving situation in information and communication technology (ICT). Because of restricted resources, our course is not compulsory, but optional to the students.

Concept

The goal of the course is to prepare students to use computers and communication technology in their future work in the classroom. This is not an easy task. Reports and our own experience show that ICT is not commonly used in grammar schools. For the novice teacher, there are many obstacles. Teaching itself is difficult and must be learned through practice. Due to their own lack of teaching experience, novice teachers tend to use the experience they

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gained in earlier situations as learners. In the technology context, experience from a learner perspective rarely exists. Furthermore, working with computers on a personal basis and embedding technology in a classroom setting are two totally different tasks. There are considerable differences concerning pre-knowledge and the pre-skills in relation to ICT among the participants in our course. The ability to use technology is a pre-requisite but not a guarantee for effective action in the classroom. Experts in this field refer to typical examples, but there is rarely agreement on the best way to apply technology-based teaching. A very important point is the following: The participants of our course have studied, and will teach different subjects: Languages (German, French, English, Italian, Spanish, Latin), History, Mathematics, Physics, Chemistry, Biology and Geography. The questions arising in the teaching of English for example or Mathematics using ICT are really different. All in all, teaching such a course is a well-nigh impossible task. However, a heterogenous audience may also have positive effects (Moser 1999).

Summarizing the facts we have to deal with three major difficultes in designing our course:

- the participants will teach different subjects
- the participants have different pre-skills in the use of ICT
- the participants have no teaching experience,
  nor can they activate relevant learner experience.

An obvious strategy to overcome the difficulties is to individualize the learning process. This means a decomposition of the course: Students work individually on their own tasks. This is quite natural in a computer context, because this machine is tailored for individual use, having only one keyboard and one mouse. Nowadays however, it is widely accepted that learning also has a social dimension and that the learning process may be influenced positively by cooperation. There is currently interesting research being done on this subject (see for example Dillenbourg P. 1999). Bringing the two concepts together results in groups of learners. The size and the composition of such a group is of course critical. During the first session we normally let the students form learner groups composed of two to four participants teaching the same or a similar subject. The differences in pre-skills may also be evened out in such groups. This difficulty can, however, not be completely resolved. Cooperation in the groups and imposing the focus on didactical reflections reduces this difficulty. The third problem is the most difficult to overcome in a university framework. The best thing would be to give the students the possibility to observe lessons and to conduct their own teaching experiments. We are able do this to a very limited extent; external constraints do not allow more. As mentioned earlier, novice teachers use their learner experience as a resource in their own teaching activity. Therefore, in our course we try to prepare learning arrangements, which build up the experiences of the students, and we try to give concepts which they can copy later in their own classrooms. Our intention is a kind of "hidden curriculum". This may be explained easily by the famous saying: "Teachers teach as they were taught, not as they were taught to teach." By individualizing the learning process, we observe another slogan: "self-directed learning". This is an essential point in every learning process: To what extent is the learner guided from the outside and what part does he manage by himself. There is a continuum of possibilities from leading by the nose to not being guided. It is an art to find the right balance for every audience. Our convinction is that in most cases guidelines are needed to produce an efficient learning environment. Within an carefully fixed framework the participants of our courses have the liberty to create their own learning path.

Basic Course in Detail

In the first semester of our course (called "Grundkurs" in German) the student acquires an overview, basic techniques and basic knowledge. During this semester there are about fourteen sessions. Five of them, spread out over the semester, are plenum events where demonstrations, talks and other input are combined with group activities. The other sessions are arranged by the learner groups. A task sheet (called "Semesterpass" in German) describes the work to be done as structured in the following sections:

A organisation and tools
B telecommunication
C software for learner (tutorials, simulations, etc.)
D application software
E authoring software
F articles, books, videos
G practice
H portfolio

Figure 1: Part of the task sheet

A booklet (called "Arbeitsheft" in German) contains the necessary worksheets, guides and schemes organized in the same sections as the task sheet. Additional information can be found on our webpage (http://www.unizh.ch/hlm/ascifu/index.html) and additional material, for example software or videos, must be ordered by electronic mail. The learner group has to plan its activities at the beginning of the semester and report them to the professor responsible. Most communication is conducted by electronic mail. Search competitions on the internet aim to improve the search skills and the regularity of e-mail use of the participants. A panel discussion with active teachers and visits to schools give an insight into classroom reality. The progress of the group is supervised by the professor responsible in periodical conversations. As an example, let us take a closer look at section C, where a special scheme presents the tasks required. A software tutorial introduces the students to the features of tutorial- and drill programms. Learning software of their choice, ordered by mail, must be tested and evaluated by the groups. Leading questions are – what are the benefits of this software? – can the task also be fulfilled without technology ? The findings and the evaluation must be reported to the supervising professor.

Figure 2: Part of the scheme (section C)

Project Course in Detail

During the second semester of our course (called "Projektkurs" in German) the student applies the knowledge and skills gathered to a classroom situation. The goal is to develop, perform and evaluate lessons in the specific subject whereby ICT must be inbedded. Again students of the same subject work together in groups to carry out this task. Possible interdisciplinary cooperation is encouraged of course. Often groups firmed in the preceeding semester continue working together. The course is arranged as a pedagogical project. There are different definitions of such a project and we will therefore outline our concept, which is based on a description of Bruggmann (1992). The framework is given by the following facts:

- lessons must be designed, performed and evaluated
- at the end of the semester the results must be presented to the plenum
- during the lessons information and communication technology must be used
- milestones and a learner diary will accompany in parallel to the process

Besides these obligatory conditions, the groups are free to design their project. This means that decisions concerning the number of lessons, the topic, the technology used (internet, software, etc), to what extent the technology is used, the pedagogical methods and the social form are made by the group. We have a database with addresses of teachers who have agreed to place a class at our disposal. However, the groups themselves have to arrange the necessary cooperation. The most difficult aspect in projects is time management. As already mentioned, we emphasize the idea of guidelines and we shall now describe how we realized this in the project part of our course. The members of a group have to sign an agreement fixing in advance the topic and plan of realization. This should help to set realistic objectives, and is done in cooperation with the supervising professor. Secondly, each participant writes a learner diary und has to discuss it with the professor responsible. In particular we point out the metacognition aspect. Students dislike writing diaries during the process, but describe it afterwards as a very useful tool. The milestones are the third way in which to guide a project: The group regularly has to present the progress made in the project, the problems encountered, the support needed as well as the modification in project goals.

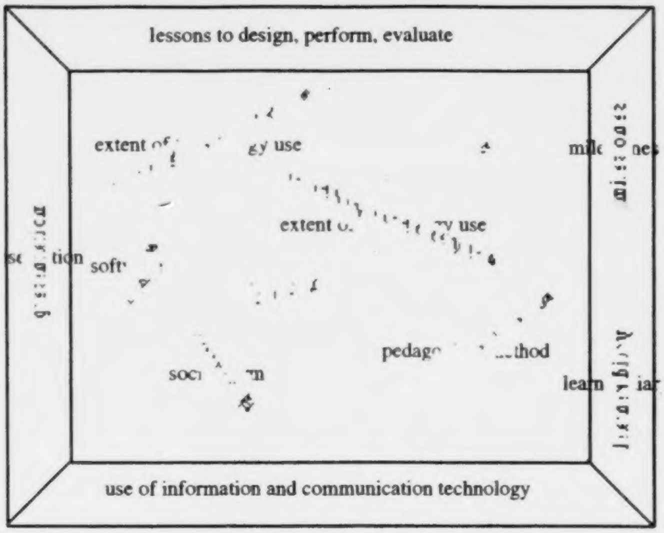
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Figure 3: Framework of our pedagogical projects

Conclusion

As the development of technology progresses, course design and teaching material must be continuously adapted. Three years ago, we published a concept for cheap and efficient in-service teacher training (Kuster et al. 1996). We have recently been able to transpose this, starting with teachers of two subjects. There are plans to make connections between these two areas: On the one hand bringing together experienced teachers, and on the other, the less experienced students. There could be mutual benefit in such exchange. Moreover, we have started to use groupware tools, which will be useful in the project part of the course and in in-service teacher training.
Many articles discuss pre-service teacher training in the area of ICT (see for example Murphy and Greenwood 1998). Our efforts to focus on technology and on teaching style, and to offer student teachers excellent learning arrangements to enrich their own experience has proved very successful.

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Dialogue of Teachers and Students on the Internet in Poland of the Nineties in the Context of Moulding the Creative Vital Orientations by E. Fromm

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Abstract: Based on the latest Polish experience, the report attempts to estimate the validity of the common belief the Internet provides opportunity to create new quality in teacher-student relation and aids the process of moulding creative vital orientations of the two parties involved in the process of educational interaction. The main objectives of the article are determining possible obstacles to widespread distance education, acknowledging first efforts of communication through the Internet administered by educational institutions in Poland, and assessing how the initiatives aid the development of teacher and student creative attitudes.

Introduction

The objective of the paper is estimation – on the basis of the recent Polish experiences - of truth of the common belief the Internet provides opportunity of new partnership quality in teacher-student relation and aids the process of moulding creative vital orientations of both teachers and students. Hence, several questions must be raised on the subject. One issue is how possible is it in Poland? How easy/cheap is the access to the net for a Polish student or teacher? What can be other, non-economical obstacles against the dialogue over the Internet? What possible psychological barriers may underlie teacher and student attitudes to the use of computer in education or to Internet communication? What emotions do they declare? I searched for the answers to those questions in Polish GUS Statistical Yearbook of 1995-1997, in applicable literature and in my own surveys.

Other essential question to be answered is where such dialogue occurs by determining first endeavours of Internet communication administered by Polish schools. Where are such schools? How do they use the net for teacher-student communication? How seriously is the Internet used for educational purposes? How helpful for development of creative orientations is it and finally what (first) initiatives in connecting teachers with students are currently emerging in Poland? I tried to find answers in both electronic and printed reference materials, however I based my search particularly on WWW resources.

The condition of computerization in Poland

Statistical data on computerisation in Poland are provided below. The rates are given for various regions of the country and various social status groups. Poland is a country where distance education can be applied more widely, outside the local experiments conducted by educational institutions of different levels for the last few years. There are several economical, financial and psychological reasons for the above statement. Polish Gross Domestic Product is continuously growing. Annual rates of GDP increase place Poland among the most dynamic group of developing countries. There was 125 GDP increase rate in Poland in 1997 (the rate had amounted to 100 the year before), which was more than in most other European countries: the rate was 61 for Russia, 109 for Germany, 99 for Czech Republic, and 64 for Lithuania. USA achieved 110 GDP increase rate in 1997. It has to be certainly remembered GDP per capita in USD is still quite low in Poland and did not exceed 3702 in 1997, while in Germany it was 25754 and in Czech Republic 5184, however it was as little as 2982 in Russia and 2097 in Lithuania. In the USA, the rate was 29187 (Statistical Yearbook 1998).

The described financial condition of a country cannot be regarded as unimportant for the idea of the broad use of multimedia communication technology for educational purposes. The rates of computer equipment found in households are as vital for distance education. Unfortunately, the Polish Statistical Yearbook does not quote the number of personal computers used in Poland vs. other countries. However, the source provides information on rates of radio and television sets per 1000 population, which too are potentially important for distance education purposes. The rate here is 311 for Poland, 564 for Germany, 377 for Russia, and 805 for the USA. (Statistical Yearbook 1998) In 1995 there were 148 telephones per 1000 population in Poland, 493 in Germany, 170 in Russia, and 626 in the USA. The rate of telephones in Polish households (which is important for DE since it determines how many computer users can access the Internet via their modem and a phone line) is too small,

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however the rates of increase in the number of telephones are truly satisfactory. The rate was 86 in 1990, 102 in 1992, 129 in 1995, 169 in 1996, and 193 in 1997 (Statistical Yearbook 1998). The source provides information on computerisation in Poland, however its relation to other countries in not quoted. Means for automatic production processes and electronic media in industry, and households furnished with selected durable goods are recognised. 88 publishers and printing firms had access to local area networks (LAN). 38 firms had access to external computer networks and 64 used Internet services in 1997. (Statistical Yearbook 1998)

Following table presents rates of computers found in households with specified number of person in 1997.

Table 1. Rates of microcomputers in households with specified number of persons in 1997 (Statistical Yearbook 1998)

Household categories	1	2	3	4	5	6+	Total
Employees	4.6	8.6	14.7	17.9	13.0	8.2	13.6
Employees in manual labour position	1.3	3.2	7.6	10.8	9.3	5.7	8.0
Employees in non maual labour position	6.9	13.3	23.9	29.8	22.6	20.0	21.7
Employees - Farmers	-	3.4	5.2	6.9	7.6	3.4	5.6
Farmers	1.7	0.9	2.0	4.7	5.2	3.6	3.4
Self-employed	21.1	20.7	25.4	27.4	23.5	13.3	24.4
Retirees & Pensioners	0.4	1.5	5.4	8.6	5.6	4.3	2.4
Retirees	0.5	1.5	6.2	10.3	7.2	4.9	2.5
Maintained from non-earned sources	3.4	4.4	3.4	2.2	2.2	3.2	3.2

The above figures show considerable diversity in rates of computers found in Polish households in relation to social and employment status of the families and the amount of children. Self-employed middle class families consisting of 3-5 members (i.e. with 1-3 children) own the most computers and retirees and pensioners own the least. The challenged position of the latter is certainly different from the situation of American retirees and pensioners. On the other hand, even in the wealthiest group computers are found in less than one third of the households and no information is provided about their access to the Internet.

Another question concerns the number of people now educated in relation to the number of population. In other words, the question concerns participation of young people in Poland of the nineties in various forms of education, regardless of its level. The answer will allow rough estimation of how much the educational needs (aspirations) of the residents of Poland, especially young adults and children, are satisfied. It will also make it possible to determine whether the current traditional system meets the needs and requires no changes or it's the opposite. Moreover, the number of foreign students in Poland will make it clear how accessible Polish universities are for foreigners. Thus, the figures will provide an answer to how much the current educational system meets the market demand and how much it should be modernised.

In 1995, primary education in Poland was provided to 130 students per each 1000 population, vocational education to 41 students and high school education to only 18 students per 1000 population. In USA, the figures were relatively 90/?/81, in Germany 46/28/72, in Russia 53/9/84, in Lithuania 60/14/86, and in Slovakia 62/76/48. The minute percentage of high school students in Poland is striking (Statistical Yearbook 1998). In case of university students, the tendency is less evident. In 1995/96 Poland provided higher education to 248 students per 1000 population while in USA the number of students was 540 per 1000, in Russia it was 300, in Lithuania 202 students, in Germany 264, and in Slovakia 172 students per 1000 population. While analysing the rates, one should remember about radical changes made on the map of Polish universities and colleges during the last several years (Statistical Yearbook 1998).

There have been established nearly 200 new non-state higher education centres in 1990, which offer higher education and thus certainly aid state universities, so while there were 248 university students per 1000 population in Poland in 1995/96, there had been only 134 in 1990/91. Unfortunately, Polish higher educational system provides too few students with opportunity to learn at the more popular courses. Classes are based on the traditional system of lectures, moreover courses consist of mostly obligatory subjects and students cannot chose their teachers. Distance education provides an opportunity to overcome problems of too little space or even lack of classrooms, of Polish university teachers overworking in spring and of under-heated rooms in poorer schools, and it also gives some hope for adding new and more personal quality to the traditional rigid teacher-student relations.

In 1995/96 there were slightly over 5,000 foreign students in Poland; in 1990/91 there were 4,300 of them. That was a small group within the total number of university students: 512,000 in 1990/91 and 956,000 in1995/96 (Statistical Yearbook 1998; 599). It can be inferred the current Polish system of education based mostly on lectures is not attractive for residents of other countries. Distance education, using good system of communication and information technologies, might result in more foreign people studying in Poland. In my opinion, the motivation might be diversified from sentimental (descendants of Polish immigrants) and therapeutic (e.g. new Polish immigrants not yet adjusted to their new country) to cognitive purposes.

The motivation and emotions supported towards the computers by the Polish teachers and their students

One question that should be asked now is whether Polish teachers and students are ready for distant education employing advanced computer technology. Are they well motivated to communicate e.g. over the Internet? What emotions do they declare on the prospect? What do they feel when they are about to sit behind the computer? Is it trust or fear? Monika Kostka and Irena Pulak conducted their survey in Malopolska region of Poland in 1995-1997 (1998). The survey covered about 306 people: 170 teachers (more than a half of whom were primary school teachers) and 136 students of arts and pedagogics. The teachers declared their practical ability to use tape recorder (96%), video recorder (89%), television (89%), slide projector (85%), computer (44%), writings projector (37%), and less than 20% admitted their ability to use other equipment like episcope, epidiascope and CD player. The teachers most often use tape recorder (80%), video recorder (78%), television (74%), slide projector (63%), computer (44%), writings projector (37%), and less than 20% admitted their access to other equipment like episcope, epidiascope and CD player. The teachers would like to use also computer (75%), video recorder (60%), television (47%), tape recorder and slide projector (44%), CD player (36%), writings projector (25%). Teachers/students would like to use computer (75 / 87%), video recorder (60 / 97%), television (47 /87 %), tape recorder (44 / 89%), slide projector (44 / 72%), CD player (36 / ?%), and writings projector (25 / ?%). Only 19% surveyed teachers had any contact with computers. 7% took a course on using a computer, 3% learned on their own and 81% had not used computers at all. It is interesting to notice nearly one third (29.7%) of 219 surveyed students of political science in Silesian University in Katowice, Poland, declared in January 1998 they had never used computer so far (Gramlewicz 1998; Tab 3 p320).

When I was looking at the title of *How teachers use the Internet* (Serim & Koch 1997) on teachers' experiences with internet, it crossed my mind to survey whether, and to what extend, Polish teachers use the internet. My findings are quoted below, based on my survey of emotions studying teachers have toward computers and the Internet.

In 1998 I surveyed 200 teachers studying pedagogics in Wszechnica Mazurska in Olecko, Poland on their knowledge of basic terminology connected with the use of computers for educational purposes (Górnikiewicz 1998). The whole surveyed group consisted of 3rd-year students who had done a regular course in computer usage before. The results of the survey show their computer knowledge was minute. The recognised terminology was connected with very rudimentary knowledge, not adequate for practical educational use of computers. The students had theoretical rather than practical knowledge of computer terminology that had been mainly heard of and not experienced. The surveyed teachers seldom use computers and still do not use the Internet almost at all. Nevertheless, the reason is not their fear of computers (they declared positive emotions toward computers). The reason is they did not yet realise how important it may be for their job. Given the opportunity of active participation in computer courses and provided with practical computer skills, they are bound to give up the use of their pens and papers or chalk and blackboards in favour of more sophisticated means of conveying information. On the other hand, even in the most advanced countries (Japan, USA, Sweden) chalk and blackboard still play crucial roles in education (*chalk and talk*; see Pettersson 1997). Hence, it seems most Polish schools still have a long way to go from traditional handbook to electronic one, regardless of the recognised drawbacks of the former (see Wisniewski 1996).

First Polish institutions using the Internet for teacher-student communication

First Polish institutions using the Internet for teacher-student communication are presented below. They comprise schools and other establishments co-operating with their American partners for promotion of the idea of education over the Internet. One of them is PAM Centre in Lodz assisted by University of Maryland; another is Internet for Schools (IdS), which has particularly contributed to promotion of advanced information technologies in education in Poland. The results of IdS actions prove its effective use of American foundations' financial assistance it is offered. In found the Polish institutions offering distance education mentioned above in the Internet by means of Internet Explorer. I used Polish Infoseek, Polish and English Wirtualna Polska and Alta Vista, and Yahoo search. I also used Webcrawler. I used both Polish and English keywords like *distance education, distance learning,* or *distance teaching*. Polish servers provide different amounts of information. Wirtualna Polska provides merely several links, e.g. 2 links to *studia na odleg'cœ*(WSiP publishing house and CKU in Tarnow); 2 links to *distance learning* (e.g. SITA Learning System) and 1 link to *distance education* (Doctor Q Cenrum Edukacyjne *alias* Lotus Authorized Education Center, which runs computer courses). On the other hand, Polish Infoseek provides plentiful information on the subject (e.g. 2,391,625 links to *studia na odleg³oœæ*).

There are several centres for open education in Poland that are interested in distance teaching. Those institutions are often called Continuous Education Centres (Centrum Kszta³cenia Ustawicznego; CKU) or Distance education Centres (Centrum Edukacji Niestacjonarnej; CEN). They are usually connected with universities or technical universities. The ones whose WWW sites are relatively easy to access are the establishments in Bytom (Regional CKU in CKU), Gdansk (DECTUG and CEN), Cracow (CKU at AGH), Kielce, Krosno (CKU), Wroclaw (CKU), and Zielona Gora (CKU). Below are two examples.

Kielce establishment belongs to Swietokrzyska Technical University. It runs distance courses in computer architecture, AutoCad 13, English, management, economics and finance (http://www.tu.kielce.pl/~cku/). Other courses are interpersonal communication (30 hours) and 3-level language courses (80 hours each). The institution provides also post-degree courses (280-290 hours), however they are not available in the distance education system. Students of Management and Marketing have conducted an Internet survey for the institution mentioned here to gather opinions on Internet virtual universities and estimate potential interest in such forms of education.

The centre employs four administrative workers. It is worth mentioning CKU is not operating by itself; it belongs to European Distance Education Network (EDEN).

Distance Education Center at Technology University of Gdañsk (DECatTUG) assumed the task of promotion of Open Distance Learning (ODL) methods in its local environment and organisation of ODL training within EU programmes of PHARE, Leonardo, and Socrates. Moreover, the institution partakes in realisation of various Internet-based educational projects like PASCAL, EE-DEC, TTT, ENGTUS, ThinkQuest, I*EARN, and National Geographic Kids Network. The centre was established in 1997 within Phare Multi-country Programme in Distance Education (Establishment and Operation of Regional Phare Distance Education Study Centre). This is an experimental educational institution conducting educational projects connected with the use of computer networks and multimedia technologies. The project of *Join Our English Language Club* (http://despina.advanced.org/17844) was admitted to a contest final in Washington in 1997. In 1998, the project of *The Ways of Communication* (http://despina.advanced.org/17844) was realised.

Distance Education Centre at AGH in Cracow introduces elements of distance education to realisation of chosen regular courses by the use of videocassettes and diskettes, without the need of Internet teacher-student communication. The centre runs various professional courses and ones preparing for university examinations. In 1997 a seminar was held in Dom Goscinny in Cracow, Poland, on Information about Possibilities and Conditions of University Distance Education, which initiated a series of Open Learning seminars.

CKU at Technical University of Wroclaw runs optional courses for students, computer courses, and seasonal "schools" and seminars, however it does not partake in practical promotion of distance education forms and methods. Among the optional subjects, students are offered classes in language culture meant to teach the art. of self-presentation in front of cameras and presentation of a given topic.

International E-mail Tandem Network is a highly interesting form of Internet education, providing opportunities of both teaching (one's partner) and learning a foreign language (from one's partner). The system is based on co-operation of two universities speaking different languages and located anywhere in the world. Helmut Brammerts from Bochun University, Germany established the Network in 1992. Polish Jagiellonian University, Cracow, partakes in Polish-English and Polish-German subnets.

Post-Graduate Distance Education Centre run by Lodz University and Polish American Management Center (PAM Center) and Virtual University at Mila College in Warsaw are two examples of the most interesting projects on application of DE in Poland.

PAM Center located at Department of Educational Science at Lodz University, Poland started enrolment to new Distant Education School in 1997. The course consists of 300 hours conducted partly in the distance teaching system and partly as meetings. The use of modern multimedia communication means of voicemail, email, BBS, online communication via WWW pages and compressed video is assured. The Center is co-operating with University of Maryland University College (UMUC), USA. The course lasts two semesters from October to June, providing its graduates both certificate of completion of the course and PAM Center certificate. The course provides education to people of various professions: the learners are not only teachers but also physicians and office workers. PAM Center also runs MBA and MiniMBA studies, which are MiniMBA Management School and Human Resources Management School. The graduates belong to the Alumni Club. PAM Center web site administrators introduced noteworthy amount of links to WWW sites. Those links are connected e.g. with distance education in Poland and several other countries (the list is reduced to barely a few links among many possible ones) and sites that can be useful for teaching (a relatively long list).

Virtual University (www.uniwersytet-wirtualny.edu.pl) is an educational experiment conducted by Professional Training Institute of Mila College (http://www.mila.edu.pl) in co-operation with several other Polish universities. Mila College offers lower and higher degree studies of computer science, economics, business management, data processing management, finance and accountancy, and tourism and recreation. Mila College is advertised on its WWW site as "the first Polish Internet school". The college co-operates with De Monfort University, United Kingdom and has been operating for seven years. It is well equipped with computers and has its own 1 Mb line as well as its own Virtual Library that is also described as the first one in Poland. After paying the initial fees, each student is provided their free personal email accounts. Co-operating with Regional Education Centre in Polkowice, Mila College has long experience in distance education, which is currently unique in Poland. This experience was the basis for the establishment of Virtual University, which has broadened its undergraduate computer studies offer by undergraduate and post-graduate studies of European integration. Virtual University currently has approx. 50 students from all parts of Poland living in small towns as well as in big cities and aged between 20 and 43. The university maintains virtual contacts with its 2000 ex-students who still have the right to keep their school email accounts and use the school library resources. University consists of 20 teachers and 5 administrative workers. It is worth mentioning Professional Training Institute applies Virtual University technology to its courses for the disabled in Adult Education Centre of Tczewo and Professional Promotion Agency of Gdansk. The disabled are thus given the opportunity to learn the economic profession.

Institute of Teaching Technology at Department of Pedagogics, Copernicus University in Torun is another vital institution among the pioneers of DE promotion (and promotion of practical use of advanced information technology for educational purposes) in Poland.

There are many new initiatives in Poland on the use of computer technology for distance education purposes. One of the latest is foundation of General Internet Gymnasium by Polish educational reform advocates working in Educational Initiative Centre (CIO). Both teachers and promoters of culture assemble in the Centre, which is lead by celebrities of Polish science and culture (e.g. Andrzej Wajda, Henryk Samsonowicz, and Andrzej Janowski). The main objectives of Internet Gymnasium are to present advanced multimedia technology to teachers and help them apply it to their work. Another endeavour to promote distance education is the project of Wszechnica Mazurska, a non-state school of higher education in Olecko, based on the idea of individual Internet studies. The project would comprise high school older students and would enable them to take chosen university courses in advance so that they have less work at university afterwards (provided they choose to study at Wszechnica Mazurska). The initial connection between students and college is highly desirable. Moreover, the project would also cover soldiers in service and any other individuals forced to postpone their education.

The current forms and methods of using the Internet applied by the Polish educational institutions in the light of Fromm's concept

Distance education is merely emerging in Poland: so far it is connected more with providing knowledge rather than creative individual development. In terms of Fromm's creativity concept, DL greatly develops productive rather than destructive orientation. It is also focused on being vs. having mode and develops individual skills (see Fromm 1994). This kind of education provides students the choice of time, place, and frequency of their contacts with tutors and other university staff. It gives them free access to the world's information highway and contact with the whole world, or at least its electronic presentation.

The use of Internet seems particularly important in the light of Fromm's concept. The system of retrieving information is even more important here than its availability as such. Users check various browsers looking for clues where to follow; they try new links uncertain of the result and explore various sites. This is their mental journey. The net users can feel liberated from their bodies and limited only by how much faith in their actions they have or how imaginative they are. The Internet makes them move across continents and through space with the speed of their thoughts. (Or is it the speed of their fingers?) The eternal conflict between the human will and the limitations of the human body seems to vanish.

Surfing the Internet can also be compared to journey within one's dream since the net user experiences a specific kind of logic there. This logic allows travelling through time, recognition of graphic designs as meaningful symbols, and admitting more importance to things that feel more intensely. People use the language defined by Fromm as the only universal human language whose knowledge is the key to learn about oneself (Fromm 1972), which in turn is a necessary condition of personal development. Such journey involves challenge, hope of learning new secrets and finding new solutions, and changes of moods from confidence to uncertainty. This is work and fun, adventure and inspiring or exciting way of spending one's free time. It fuses work with fun and rejects the gap between the "useful work" and "idleness", implied by cultures. It is also worth mentioning that although the Internet employs but two senses of sight and hearing it employs them to a substantial extent.

Success of DL is greatly subject to inventiveness and commitment of tutors, well exemplified by work of Jonathan Dron for and with his students at Brighton University, UK (Dron et al. 1998; 1999).

Conclusion

To sum up: in my opinion it is far too early to estimate how useful specific forms and methods of Polish educational institutions may be for moulding creative vital orientations of involved teachers and students. Nevertheless, theoretical possibilities of the Internet and experiences of more advanced countries in distance education allow optimism on the subject. Thus, we hope to witness similar success in Poland in the near future provided distance education develops in our country and becomes sophisticated enough to serve more purposes apart from delivering information or developing technical skills.

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Romanian Internet Learning Workshop: Building an International Community of Experts on Learning in the Internet

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Abstract: In the summer of 1999, the "Romanian Internet Learning Workshop" (RILW) took place for the third time. The main goal of the conference was to build and maintain a community of Romanian and international experts as a framework for exchanging domain knowledge and developing practical, collaborative projects. The presented papers of the workshop were grouped in three sections: (1) Theoretical and practical perspectives of learning on the Internet, (2) The Internet as a learning environment for schools, universities and adult education, (3) Internet tools for teaching. This paper concentrates on the projects and issues discussed at RILW.

The conference has been successfully held for three consecutive years and it is planned to continue and to be extended with other related projects such as a summer school to the same subject area in the context of the European Socrates/Erasmus project.

Why RILW?

This summer (1999), the "Romanian Internet Learning Workshop" (RILW) took place for the third time, organized by the cultural society "Polygon" (NGO). What were the needs which lead to the idea of this conference? What were the goals?

As learning with the Internet is still a new topic in educational science there is a scarcity of literature (i.e. research reports and best practice examples) and not enough to satisfy the needs of researchers and teachers. In addition, the situation in Romania is special, there have been recent changes in the political, social and economic system which has necessitated fundamental changes in the educational system. This is why initial and professional continuing teacher education in Romania must be able to offer teachers a sound technical infrastructure accompanied by up-to-date factual information as well as training in modern didactical methods, including the use of New Media and the Internet. Consequently, there is a large demand and interest in this subject area.

Goals of the RILW Project

In this context, one of the most important goals of RILW is to build and maintain a community of Romanian and international experts as a framework for exchanging domain knowledge and organizing collaborative projects. Further, it is an opportunity for foreign participants to confront their knowledge and practical experience with the particular context of Romanian schools and universities as well as to explore new possibilities of cooperation.

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The Nature and Substance of RILW

RILW has taken place annually since the beginning - in July of 1997. At each event, some 20 to 30 papers were presented and 4 to 7 round panel discussions were held. Because the RILW organization team is spread throughout Europe, a large part of the organizational work in preparing the conference has been carried out using the Internet. The conference is represented on the Internet by its homepage (http://www.itim-cj.ro/rilw/, mirrored at http://rilw.emp.paed.uni-muenchen.de and also at Hungarian, Spanish and American sites) as well as by a mailing list.

In the following, we shall outline the most relevant topics discussed at RILW. The accepted papers were grouped in three sections:

(1) **Theoretical and practical perspectives of learning on the Internet**. Papers included in this category were engaged in defining a broad theoretical context or practical background of learning on the Internet. According to these authors, new communication technologies will radically change the way people learn. Universities are becoming more flexible in what is being offered to students, the times and frequency of course presentations and the nature of new student cohorts (opening access to a greater diversity in level of ability, age and geographic location). Traditional values are being challenged and a growing global market competition are putting pressures on educational institutions to change. These changes are enabling a way of learning which is not restricted to the time spent in schools and universities, but extends into a life long process (Clayton 1999).

From a theoretical perspective, knowledge is viewed as actively constructed by the learner. As a consequence of this, learning on the Internet is seen as a process of constructing knowledge cooperatively and at a distance. The design of an Internet-based learning environment should offer learners the opportunity and the resources to support this process (e.g. Gallenberger, Gruber, Harteis & Stamouli 1999). The connection between this theoretical position and practical educational work is illustrated among other works in Nistor (1998).

Taking another perspective, some authors regard learning in the Internet in the context of the particular economical, social and cultural changes of the last ten years in Romania. The technical infrastructure is poor; in Romanian schools, there is less than one computer available for 170 pupils; thus, the use of computer and communication technologies is not yet part of the educational culture. Authors from Romania as well as from Western-European countries show the need for cultural and structural change in the educational system (Clark 1997; English 1999; Jalobeanu, Platon & Predescu 1999).

(2) **The Internet as a learning environment for schools, universities and adult education**. A large part of the papers presented describe examples and case studies of Internet-based learning environments in schools, universities and further institutions for adult education. In traditional campus-based universities as well as in specialist distance learning universities, the usual courses are being successfully extended by the addition of virtual courses (Berz, Erdelyi & Hoefkens 1997; Ribold & Weber 1998). Besides researchers' interest for virtual learning environments, important reasons for the use of the Internet in education are the need to reach isolated geographical areas (Lindsay, Ion & Murdoch 1997; Yrker & Uzer, 1997) and to enable people to communicate at a distance e.g. as a vehicle for cultural education by interacting with people around the world (Platon 1997; de Presno 1999; Smith 1999). An important question regarding virtual courses is how are they to be evaluated? This has a dual meaning – what are appropriate assessment procedures? And how can the course as a whole be evaluated with the aim of making improvements for the next presentation. These issues are discussed in several papers (e.g. Harteis, Gruber & Gallenberger 1999).

(3) **Internet tools for learning**. Online learning requires special tools adapted to the particular needs of the learners or to special didactical concepts. At RILW, several Internet tools for learning were presented such as tools for automatic generation of educational WWW pages (Trausan-Matu 1999), a tool for cognitive mapping on the WWW (Ertl 1998), or various applications of artificial intelligence in virtual learning environments (Florea 1999; Majumdar, Majumdar & Banerjee 1998).

Round panel discussions about educational and technical topics have been a regular feature at all the meetings of RILW. In this way issues have been prioritized and problems along with potential solutions have been considered. One particularly valuable proposal under discussion last year involved the task of designing and delivering new courses to be offered on a networked study-center system in Romania. The known existing issues were first acknowledged: local and individual initiatives did not always have support from the authorities; legislation of this form of education is very recent; accreditation is still being defined and developed; quality assurance methods need priority attention to overcome a previous lack of rigor;

strategies are needed for study centres to co-operate with each other and the type of students to be targeted as well as form of media to be used for delivery needed consideration. The outcome of the discussion highlighted issues that are pertinent to anyone who has the task of designing new courses for extensive use:

- Courses are more likely to be successful if there is a perceived need by the student for the subject and if the students are very well motivated and thus highly committed.
- Ease of access to equipment and facilities is very important
- Preparation may be needed in IT skills training for students and tutors
- Choice of media for delivery should be based on the required didactic method used in course presentation
- Regarding a target group – evidence suggests that post-graduate level distance courses have the highest demand and success rate. In which case, existing teachers would be an appropriate group to start with and there was a need for continuing professional development in this area.
- Support from higher authority is not always present but this should not prevent the design of new courses taking shape.

Other round table topics have been: The impact of the Internet on children's civil education; Virtual libraries vs. virtual universities; Universities and international cooperation; Electronic distance education: The development of DE centers in Romanian Universities and Teachers' Houses. A common frustration that has been frequently voiced is how the heavy weight of bureaucracy and the feather-light touch of financial investment has thwarted many creative initiatives in Romania. The continuation of RILW as a platform for inspiration and collegial support is, therefore, all the more essential.

Results & Perspectives

The conference, now aged three, is based on the enthusiastic and permanent participation of a core number of specialists from different countries like Germany, Great Britain, New Zealand, Spain, USA, and of course Romania. Other participants have been mostly university professors but has also included under-graduate, graduate and doctoral students from Romania and abroad. The participants found the papers and discussions and the informal exchange of experience and knowledge to be most interesting and fruitful. Though our cultures and contexts are different, many of the difficulties and problems that arise regarding the new methodologies and features of learning on the internet, are familiar. A particularly satisfying outcome of these workshops are the lessons we have learnt, often repeated in different contexts, about internet-based learning. Regular findings include:

- Suitable pedagogic designs involving student-centered learning, problem-based learning and 'real-life' contexts and activities
- The need for staff development training in an on-line learning environment
- The need for students to be prepared with 'learning skills' training (team skills as well as IT skills)
- The need for constant monitoring, evaluation and improving of virtual courses

There were many factors that contributed to building the community of experts. Of course, the most important of them was the scientific exchange due to presenting and discussing papers at RILW. A lot of cooperative work between the experts took place before the conference, while intensively communicating via e-mail, reviewing papers, organizing the conference, publishing all the information in the WWW. Also during the conference days, there were many informal discussions between the participants, between experts and students - in the conference rooms as well as while visiting interesting places in Romanian towns and villages or trekking in the Carpathians (involving hill walking and cave exploration).

Social and cultural events during all the conferences have not only given flavor and character to these meetings but have also enabled meaningful professional relationships to develop by sharing real-life experiences (as mentioned above). Together with the opportunities given for the silent sharing of musical and artistic performances, we have learnt far more than words could possibly offer. It is due to the vision and practical help of the Polygon Society (joint organizers) that RILW has been enriched with a mixture of culture, arts and science. This vision stemmed from oppressive earlier days when communication between disciplines and between countries was very limited. Now through the freedom of the Internet, we have organized, traveled and participated in scientific, social and cultural events mutually benefiting from the resulting knowledge and friendship gained.

A very important development that indicates a successful outcome of the RILW is the growing level of attention that Romanian authorities and newspapers are giving to the use of the Internet in education. Since the beginning of RILW in 1997, communication via the Internet has been included in political decisions and reform proposals of the Ministry of Education. More new distance education centers are continuously opening and Romania is now involved with international educational projects like I*EARN or KidLink which include many school students.

An additional perspective for the future has recently been developed - starting from 1999, the RILW was extended by a summer school in the same subject area within the context of the European Socrates/Erasmus project. A book is planned to integrate the most relevant theoretical contributions and practical examples presented at RILW. Finally, as a result of RILW, several projects are being initiated in cooperation between Romanian and Western European institutions.

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The teacher`s attitudes towards computers in education of young children

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Abstract: The paper presents a research on attitudes towards computers and educational technology in education of young children age from 7 to 11 in few public schools in Subotica (Yugoslavia). The research included over 100 inservice teachers, and was undertaken in September 1999.
The research aimed at:
- the teacher's attitudes towards the usage of computers in education of young children,
- the teacher's computers skills, and
- the teacher's attitudes on implementation of computers in the education.

The research has showen that very few inservice teachers are actually "computer literates"; the teachers don't see the possibilities of applying computer technology in their work, but are very interested and willing to advanced in that direction.

Background

By the end of the 60's and during 70's the problem of the computerization especially in the field of education had emerged and has been debated over ever since in the Yugoslavian pedagogy. World tendencies are being followed, foreign and domestic authors related to the issue are being published, articles as well, many debates and courses are organized. The new projects in introducing the newest technology as a way of improving and modernizing the education were at the time: D. Frankovic: Development of technology and contents in SFRY education, 1972; V. Muzic: A computer in contemporary education, 1973; V. Pilic and co-authors: Cybernetics, computers and education, 1975; N. Soljan: Computer assisted education, 1972; Computer assisted programmed education, 1973; M. Bakovljev: Theoretical basics of programmed education, 1972; P. Mandic: Innovation in education and its' pedagogical meaning.

The status of the students and teachers in educational process is being debated over as well as their interrelations in the student-teacher-education technology triad. Emphasize is put on 'thought activation', problem solving, learning through discovering and the individualization of the learning process. Computers take the important place in the theoretical consideration of modernizing the education. However the theory proved different to the practice, and very few things have changed since then. 20 years ago B. Vlahovic examined attitudes of teachers towards changes in education in sense of modernizing it and involving new techniques, and determined the importance of those attitudes in further development of education. It is interesting to mention that as early as then enthusiasts spontaneously have tried to initiate innovations in the educational process (Kaurin, 1999, p.431). Even in the early 80's the information revolution shock is present and it is openly feared that the gap will enlarge - between the present status in the computer science and the needs that will for sure in the future be developed thanks to computer itself (Nadrljanski, 1986 p. 10). The experiences from abroad are being accepted and the computers are being integrated into schools very intensively. In the republics of former Yugoslavia different projects are developed but based on sole experiments and not on a mass scale. We can set apart some projects as Electronic study-rooms, School mediatheques, SIS – School Information System. Initiatives as 'The Computer in School'-1984, 'Computer Aided Education', 'The Computer on University'- 1981-85. The

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possibilities are discussed: Computer education in primary and secondary schools as well as college students and thus related qualification of teachers and staff needed.

Golden Age of pedagogical theory of computerization of schools tends to decline at the time it was supposed to develop even more. In the early 90's the number of schools equipped with computers, which is a positive trend so far keeps getting bigger, however it is all up to individuals and their pedagogical intuition, ability and creativity. The most common pattern of computer equipment integration into schools are computer study-rooms and cabinets, equipped with several computers which can be used by scholars but in most cases only older scholars (7th grade and upper) may use it, during computer classes. Until that time scholars manage on their own - experimenting if they own a PC or which is the case nowadays – enroll in the specialized private computer schools, because public schools can't meet extremely high demands for computer literacy among the children of different age.

In such conditions we decided to undertake a research which should help integrate computers in everyday school life and make it possible for all scholars to use them freely. At the same time we take the teachers as the basic carriers of computer literacy. Logically, many questions add to this problem on a multi-level scale; starting from the aims and goals of the education in general, status and the role of schools in acquiring those aims, financial and technical platform in educational technology planning all the way to the capabilities and qualifications of staff needed to realize these programs. However, the readiness to use highly motivational media as a computer, touches the very person of teacher as well as technical capabilities of a school in which one teaches.

What we need to emphasize is that never before a research with this or similar theme was undertaken in this region. This fact has determined this research as a exploration study or a pre-condition to a wider inspection into teachers' attitudes, but in the time to come, educators' attitudes, as well, towards computers in the education of younger children.

The Research

The research intended to inspect the attitudes teachers have towards computers in education of children aged 7-11.

It related to 3 groups of assignments:

a) data of computer experience of the teachers (self-estimated level of computer skills; type of computer training and years of experience with computers)
b) determine the existence of computer training in schools (evaluation of technical capabilities in schools; level of computer training and the age it starts)
c) determining the level of expression of teachers' attitudes towards computers in the education of younger children and how they relate to pre-determined perimeters expressed in previous groups of assignments

The basic hypothesis of the research was that teachers already have a positive attitude to begin with towards computers in education and that they can perceive the benefits the computers have being integrated in the process of education. The research can be described as a correlated study helping us acquire data on presence, direction and level of correlation between teachers' demonstrative attitudes as a dependent variable and independent variables such as gender, age, years of working experience, owning a computer and a computer experience. For the needs of this research an analysis of correlation between certain teachers attitudes and computer experience. The research instrument used was a questionnaire constructed for this purpose, consisting of two parts. The first part is an interview, which gives us basic data of a person examined. This includes gender, age, class the one is teaching and the number of children in class, as well as the information connected to the computers (estimated level of experience, length and type of training, usage of Internet and e-mail, estimated number of colleagues and scholars who own a computer, their willingness to equip the schoolroom with computers, level of school's technical equipment. The second part of the questionnaire' is a scale of a Lickert's type divided into several sequences:

a) the role of computers in improving society and mankind
b) stereotypes about computers
c) the fear of the computers
d) motivation to use a computer for a personal and professional development
e) the influence computers have on psychophysical development of a child
f) the vision of the role computers have in school reform

Specimen description:

The research was undertaken at the end of 1999. in 12 public primary schools in Subotica (Vojvodina), the city with a long tradition of institutionalized education of the children of all ages, on an intended sample, of an improbable type made up by teachers from 1st to 4th grade (No=135). Gender structure is 120 females and 9 males excluding six examinees who didn't answer the question, expressed in valid percent 93% females and 7% males. Here is the graphical description of the sample given for some independent variables expressed in valid percentage.

The analysis of the results related to the computer competence of teachers

The analysis of frequencies and percentages of dependent and independent variables gave the following results: A large number of examinees (78.8%) doesn't own a computer. More than a half doesn't know whether their colleagues own a computer (58.3%), a small number estimates that a few colleagues (up to 5) own a computer (32.6%), while 9.1% thinks that more than 5 colleagues own one. The global opinion is that it is very rarely spoken about this issue in the school. Somewhat different is the estimation of the number of scholars who own a computer – 72.5% of teacher thinks that up to 5 scholars in the class own a computer, 23.7% doesn't know while 3.8% thinks that up to 10 scholars own a computer.

Special care was given to a teacher's computer skill self-estimation – computer competence related to the profession. Only two of the teachers (1.7%) have evaluated their skills as excellent; a small number (14.4%) as good; 24.6% as satisfying while more than a half rate their skills as weak or insufficient. This data is consistent with the other one about length of computer experience. 87 examinees (64.4%) said that has never used a computer, 19 of them (14.1%) uses it for a few months, for a year 11 (8.1%), between 2 and 4 years 10 of them (7.4%), while 8 teachers (5.9%) use it for more than 4 years. The largest number of those who can use computers said they learned the skill through self-improvement, while the number of those who attended courses (whether institutionalized or private) is insignificant. Very few teachers – 12 of them works on computer literacy of their scholars in classes. A group of questions referred to the Internet; more than half (79.2%) has never used any Internet service, and the remaining minority (20.8%) uses it for personal needs. Similar ratio refers to E-mail service as well. At the end of this analysis let us mention two more interesting facts. More than a half of teachers doesn't know if their school has issue related literature or if the school is subscribed to any specialized magazine, domestic or foreign, about educational technology. The other one is tied to technical equipment of the schools researched. Only one school of 12 has more than 10 computers, and the Computer science there starts in the 3rd grade of primary school at the age of 10 (approx.). In the remaining schools the number of computers in use goes from none to 10, and in most cases the training starts in 7th grade as a non-compulsory subject and is not available to all scholars.

Analysis of teachers` attitudes towards computers

The general attitude, which was calculated as a central value of all attitudes towards computers as a media in education, is positive, which confirms the basic hypothesis of the research. However, the attitude is not extremely strong, as seen from the results (statistic analyse was taken in SPSS for Windows).

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Variable  General Attitude General Attitude Towards Computers in Education

Mean              3,749                  S.E. Mean          ,044
Std Dev            ,506                  Variance           ,256
Kurtosis          -,036                  S.E. Kurt          ,414
Skewness          -,311                  S.E. Skew          ,209
Range             2,404                  Minimum           2,439
Maximum           4,842                  Sum             506,079
Valid observations -       135          Missing observations -        0
```

This fact is encouraging, taken previous results, which tell us about a relatively low rate of computer literacy of the examinees. Also, the fact that the research was undertaken in an urban environment has to be taken into account. It is supposed that there was a greater interest for the issue. We inspected the relationship between the self-estimated computer competence and the general attitude towards computers in young children education. With Pearson's coefficient 0.2544; $p< .05$ but $p< .01$ importance as well, we can accept a hypothesis that as the computer competence grows so does the positivity of the general attitude towards computers. Also, the expression

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of the attitude is stronger with the persons who have had a bigger computer experience, than with those who have had it little or none. It seems there is a strong causal relation between these two variables.

When a rate of accordance in single attitudes inside every sequence is being observed, the following can be concluded:

- data show that teachers rated very positively attitudes on role of computers in education. Leading attitude would be "Computer competence is very important in the society we live in" (X= 4.60, SD= .52) while the weakest rated "Computers stimulate human productivity" was also very positive (X= 3.77, SD= .89)
- referring to other subsequences given in the description of the research instrument, we can see that teachers have a high rate of accordance with the attitudes concerning the influence computers have on psychophysical development of a child. The rates range from the minimum value for "Children should use computers" attitude (X=3.02, SD=1.03) to the maximum value for "Computers stimulate a child's ability to solve problems" (X=4.08, SD= .69)
- a high rate of accordance is expressed related to the role computers have in education reform. The maximum values regard the following attitudes: "Involvement of computers into schools means a greater possibility for school modernization" (X=4.38, SD= .75); "Computers in class can make education both more interesting and stimulating for scholars" (X=4.31, SD= .73), while the minimum value concerned the attitude: "The number of computers in schools will triple in the next 5 years" (X=2.70, SD=1.07). These results fit in generally accepted situation in our schools, where chalk and the board still represent the most dominant hardware a teacher uses in the process of education
- attitudes from the "motivation of teachers to use computers for professional and personal development" group were rated very high. It seems that teachers, even with the very low financial motivation to do their job, are interested in further improving both professionally and personally, and unavoidable instrument on that way is a computer. It is encouraging to see that they globally think of themselves as persons who need to know how to properly use a computer, and to pass on that knowledge to their scholars. Besides, they consider computers as a mean to get rid of some routine duties, and as a helping hand in thinking of new ways in education and realizing those programs in the classroom. One of the highest rated teachers` attitudes was: "I think that it is very important for me to know how to (better) use a computer" (X=4.24, SD= .79). "The computer competence is a significant characteristic of an educational worker" (X=3.29, SD=1.26) as seen here was highly rated as well, even though the accordance is more dispersed than in the previous case.
- Attitudes concerning fear of computers (anxiety) weren't specially expressed neither negative nor positive and take up central values. "Computers don't scare me at all" attitude has a highest level of accordance in this group but the highest level of deviation from the central value as well
- A low level of accordance dominates among the attitudes in the group of stereotypes, and it is important that they have sunk down to the bottom of the list of attitudes. The last attitude was rated lowest on the list, but with high deviations between examinees is the attitude: "Men handle computers better than women" (X=1.82, SD=1.07)

Instead of Conclusion

Which characteristics, abilities and skills distinguish our inservice teachers? Which characteristics, abilities and skills are desirable? There are some indications which give the teachers of new era the role of a selfconfident, creative, cooperative, active, innovative...creator. Results have shown that teachers are ready and eager for changes. They need support, a well worked-out integration modelof education technology in school as well as material support, since at the turning point into the new millenium, the question of computer literacy is the same importance as basic literacy is in life and work of a modern man. And all these start with the education of the youngest generation.

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A Discussion on Integration of Educational Technology into Turkish Educational System: Is It a Tool or Aim?

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Abstract: The purpose of this study is to discuss the new skills and knowledge that the students in Turkish primary or secondary schools will be furnished with through the integration of educational technology into the educational system. In order for attainment of the major national intentions listed on the paper by Ministry of National Education (MONE), there is a need of determination of the student learning outcomes in Turkey. The determination of the student learning outcomes will help to define that the students, achieving the national goals, will be like what after passing through the technology integrated educational system.

Introduction

"Education is critical for economic growth and poverty reduction. Changing technology and economic reforms are creating dramatic shifts in the structure of economies, industries, and labor markets throughout the world. The rapid increase in knowledge and the pace of changing technology raise the possibility of sustained economic growth with more frequent job changes during individuals' lives. These developments have created two key priorities for education: it must meet economies' growing demands for adaptable workers who can readily acquire new skills, and it must support the continued expansion of knowledge" (Priorities and Strategies for Education by World Bank, 1995). To respond these priorities, today, most agree on use of technology in education. Industrialized and developing countries around the world allocate a considerable amount of money and energy to integrate educational technology (technology is used interchangeably with computer) into their own educational system so that (Information Literacy Standards for Student Learning, 1998) "the student who is information literate:

- Accesses information efficiently and effectively
- Evaluates information critically and competently
- Uses information effectively and creatively
- Pursues information related to personal interests
- Strives for excellence in information-seeking and knowledge generation
- Contributes positively to the learning community and to society by recognizing the importance of information to a democratic society.
- Contributes positively to the learning community and to society by participating effectively in groups to pursue and generate information."

The goals, mentioned above, of the integrating technology into education are drawn from a developed country's –Canada- standards of information literacy for student learning. However, the same intentions can be traced in the policies on the use of technology in education of developing countries where annual per capita income does not exceed US $4,000. Two concrete examples are Chile and Costa Rica. These two Latin American countries (Alvarez et al.) "provide a valuable opportunities to analyze two approaches to introducing computers "into developing-countries education systems. Both are democratic, middle-income countries; both have focused their computer-based education programs on schools in low-income urban and rural areas; and both intended that computer use would enhance children's cognitive abilities and prepare teachers and students to participate more fully in the Information Age… with the intent that the computers could be used to promote cooperative learning, higher level thinking, data management, and communication skills."

Similar intentions are shown in the countries like Canada and Israel where annual per capita is much higher than the two Latin American countries mentioned above. The main purpose of integrating technology into the Israel's educational system is "to match each individual student to the program of instructional activities appropriate to his/her cognitive development and preferences." In Canada, also, the intention behind the use of technology in education is to (Information Literacy Standards for Student Learning, 1998) "prepare students to locate, analyze, evaluate, interpret, and communicate information and ideas in an information-rich society. Authentic practice of these skills enables students to realize their potential as informed citizens who think critically and solve problems, to observe rights and responsibilities relating to the generation and flow of information and ideas..."

The quotations, taken from different income level countries, on the subject of determination of policy on the integration of educational technology into the education systems show that all nations view technology in education as a tool to prepare the coming generations for the needs of 21st century. This tool will "equip the new generations with the critical thinking, problem solving, self-learning, and communication skills they need to participate fully in the economy and society."

Turkish Case

As a developing country where, also, a great deal of money and energy are reserved for the integration of technology into her educational system, Turkey has almost the same overall intentions with the other nations about the use of technology in education. These intentions (Ministry of National Education, 1999) "are based on three major points:

- Given the widespread use of technology in almost all professional areas in the next century, it is one of the primary tasks of the Ministry of National Education (MONE) to provide individuals with computer skills.
- Since one of the tasks of a school is to prepare the individuals for the community, integration of changing and developing technologies into education not only will improve the quality of education and will also support social and economic development.
- Technology can enrich learning environment and be an effective tool in increasing students' motivation, their retention, and improving their problem solving and critical thinking skills.

To complete these overall national tasks, MONE started the Computer Experimental School (CES) project in 1985. With this project, educational opportunities were opened up to a wider population and accelerating human capital development. Since the beginning of the project, the broad range of knowledge and skills required meeting present- day job market needs have been aimed to give the students in these schools.

The Skills Required by Present-day Job Markets

Present-day job market needs (Information Literacy Standards for Student Learning, 1998) "information literate people who know how to learn. They know how to learn because they know how knowledge is organized, how to find information in such a way that others can learn from them. They are people who are prepared for life-long learning, because they can always find the information needed for any task or decision at hand." So, today's schools should aim to teach the young generations how to *access* the information, how to *evaluate* the found knowledge to understand whether it is the proper one, and how to *use* it to solve the real life problems, to extend their own knowledge on any subject, and to communicate in an "information-rich society."

Accessing Information

As mentioned at the beginning of the discussion, the rapid increase in knowledge and the pace of changing technology force the individuals in all professions to update their own knowledge in short intervals. To satisfy this need, one has to know how to gather the required knowledge in the shortest time. Today, to access various kinds of resources around the world, the cheapest and the fastest tools are computer and Internet technology. Many educational courseware and reference materials are available on diskette, CD-ROM, and Internet in multimedia formats. Only several clicks and pressing keys may put anyone into the center of the biggest library in the world. Therefore, in an educational environment where computers connected to the Internet are installed, the first task should include teaching the students how to find the required information from different kinds of resources. This practice maybe named as the first step of the "resource-based learning."

"By bringing telecommunications applications into the classrooms, teachers are able to create environments where students can... come in contact with a rich array of information sources that broaden their horizons. Chile currently runs one of the few successful educational wide area networks of any country in the world... It was designed as a computer network project in which participating primary schools were given the opportunity as one of the first in Latin America to use computers for on-line communication" (Alvarez et al.).

On the other hand, in the Computer Experimental Schools in Turkey, information resources related to computer technology are on diskettes or CD-ROM's. Unfortunately, the Internet connections of these schools are very limited due to the economical and geographical constraints. However, connecting these schools to the world using Internet is one of the primary tasks of MONE in coming several years. Today, the students in CES use the educational and instructional software like games, Engmatic for English and Edunetics for math, biology, physics, and chemistry to find information in a computerized environment.

Evaluating Information

After gathering the information from different resources, the students need taking an evaluation step to understand whether it is the proper one to use. The children will have to filter a great deal of information accumulated from various kinds of resources, because there is no any control on the information gathered from especially Internet. Therefore, the schools, using computer technology in education, have to give the students critical thinking skill so that they can analyze the information at hand, and select the proper ones to use.

In conventional educational systems, one of the important resources for information gathering is teachers, and the students accept what a teacher says as true and sacred without analyzing and criticizing. However, after integration of the technology into the classroom, (Alvarez et al.) "the teacher is no longer the wise man... the teacher's role has changed to one of providing guidance to the groups. It is sort of a consultant's role, advising on how to the work is done and making suggestions when something is missing. The child feels that he/she is creating and originating his/her own work and managing his/her knowledge, and this has changed the mentality of the children to be more responsible and to meet work demands on schedule...they learn much more by navigating alone." The technology in education today does not change only students. The changes in different concepts of education as a result of restructuring schools with technology (Knapp & Glenn, 1996) are:

	Conventional Schools	Restructured Schools
Learning	Students learn by absorbing information and skills presented through listening to teachers' lectures and reading textbooks.	Students learn by constructing their own knowledge through inquiry, experience, teachers, textbooks, and other resources.
Teaching	Teachers introduce information and skills, provide exercises to practice skills and memorize information and check students' ability to remember these lessons.	Teachers engage students in activities that require them to think critically, solve problems, and seek answers to their own questions. Teachers serve as model learners, mentors, coaches, and resources.
Classrooms	Classrooms are primarily isolated settings where teachers deliver information, and students practice skills and answer questions. The focus is on individual and competition.	Classrooms are multipurpose rooms where learners engage in research and problem-solving activities related to specific topics of study. The focus is on cooperation and team building.
Technology	Educational "technologies" have traditionally included pencils and paper, chalkboards, textbooks, manipulatives, and other resources that help students develop basic skills, concepts, and generalizations.	A variety of technologies are now available to assist learners in the creation of knowledge and skills. Many of these technologies can support research, analysis, problem-solving, and communication processes more effectively than the traditional resources.

Today's students must be able to (Information Literacy Standards for Student Learning, 1998):

- "Judge quality and usefulness of resources for the specific task
- Question the messages presented in the mass media
- Adapt and transfer strategies for seeking information among various technologies"

to be functional in the 21st century.

Without having the abilities given above, the children will have been like rubbish bins filled with useless, even harmful information.

Using Information

The last important skill for children is how to use gathered and evaluated information to solve real life problems. To solve real life problems, because (Ministry of National Education, 1999) "one of the tasks of a school is to prepare the individuals for the community."

The schools using computer technology in education teach students (Potashnik & Adkins, 1996) "to use a variety of computer productivity tools widely used in business and commerce" like word-processing, spreadsheets, databases, and Internet tools. The basic reason to teach the children such tools is to furnish them with "marketable skills for employment." Computer laboratories, installed in some developing countries like Mexico, and Belize, serve for "preparing students for employment in private business and government."

Computer related tools provide the children with the ability to:

- Create products using the knowledge accessed also from computer related resources
- Use systematic processes to create products
- Communicate information and ideas through products and presentation.

Conclusion

Related to the incredible advance in technology, information in today's world is in a various kinds of formats. The educational institutions using information technology aim to give the students skills of accessing, evaluating and using the information. An individual using these skills will be able to:

- think critically,
- solve problems in real life,
- learn himself / herself,
- communicate in an "information-rich" society.

Moreover, (Information Literacy Standards for Student Learning, 1998) "authentic practice of these skills enables students to realize their potential as informed citizens...to observe rights and responsibilities."

To conclude, information technology in education is only a tool to prepare the new generations for the demands of today's economies and societies. With the use of information technology in the classroom, the students will have the ability to find, to evaluate, and to use information, which is the most valuable means of production required by the modern business world.

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What Computer Education & Instructional Technology Means to pre-service teachers: A case study of a Turkish State University

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Abstract: The purpose of this study is to examine the students' perception in a Turkish State University about the mission that the Department of Computer Education and Instructional Technology conveys. This study also investigates the students' beliefs about the effectiveness of their 4-year curricula to successfully achieve their goals and missions. Data was collected through a questionnaire containing open-ended questions related to the department's mission, aims and goals and about the meaning of the terms "Instructional Technology" and "Computer Education". The findings showed that although most of the major goals were stated by the students there was no consistency among the perception of the students with respect to the minor goals. The students also had difficulty in defining the basic terms.

Introduction

Effective use of technology in the classroom has received much attention in education, and teacher-training programs are expected to produce computer literate teachers. As a result of the wide dissemination of computers in Basic Education schools, the Turkish Council of Higher Education has restructured state schools of education in 1998. A new preservice teacher education program named as Computer Education and Instructional Technology (CEIT) was established to meet the national educational needs such as: upgrading the curricula and instructional materials for the Turkish educational system, improving the teacher training process, training high-qualified people with the broad range of knowledge and skills required for the 21st century's job market. Additionally, these new departments are expected to train computer teachers for K-12 and to furnish those teachers with adequate computer skills and the understanding of instructional technology to help other teachers in enhancing their teaching practice with technology. Even though these two major goals shape the primary mission of these new departments, students of these new departments may have a different perception of their main missions because of that these two terms; "computer education" and "instructional technology" are fairly new concepts for the Turkish preservice teacher training system.

Computer Education & Instructional Technology Department (CEIT)

At the undergraduate level the CEIT Departments aim particularly to equip students with up-to-date knowledge and practical skills required for K12 computer teachers. Computer laboratories are available to enrich the theoretical background of prospective teachers. An important objective given a high priority by these departments is to provide its teacher graduates with relevant contemporary information, training, and prerequisite skills. Graduates of these departments are qualified to teach in basic education schools and high schools. The graduate program of the Department is designed to prepare graduate students instructional technology experts, and supervisors, curriculum consultants, test and evaluation specialists in instructional technology education. Computer education and instructional technology departments of all universities as well as the Ministry of Education and private schools employ the graduates of these Departments as academicians, teachers, supervisors, inspectors, curriculum consultants, test and evaluation specialists in computer education and instructional technology.

Methods and Data Sources

The target group of the study was a total of 158 students from 1st class to 4th class of the Middle East Technical University CEIT department. As the data source a questionnaire was developed. Qualitative data was collected with the help of the General Expectations and Awareness Questionnaire (GEAQ). The GEAQ, consisting of 5 open-ended questions about the department's missions, goals, curriculum and basic concepts and skills, together with student interviews intended to understand the differences in the expectations of students and the teaching staff from the CEIT Department, and to which extent the students are aware of their professional goals. The students received the questionnaire at their laboratory hours throughout the Spring semester of the 1998-1999 school year. To proof the collected information, 25 randomly chosen students from those who could answer the Questionnaire were interviewed with the same questions. In order to get a clear picture about the ideas of the students about instructional technology and computer education, the data from the GEAQ and the interviews were grouped into categories driven from common answers of students to the questions. The findings showed grade difference in the perception of the students in their understanding of the department's goals and basic concepts studied (e.g. instructional technology and computer education), were discussed with the faculty members and students with a seminar at the end of the school year.

Results

The findings for each question in the Questionnaire and the interviews can be descriptively summarized as:

1st question: According to your opinion, what are the foundation aim, mission and major goal(s) of your department?

1. % 46 of the 1st grade students, %67 of the 2nd grade students, %53 of the 3rd grade students and % 58 of the 4th grade students are not exactly aware of the major goal of the department.

2nd question: What are the minor or specific goals of your department?

1. %19 of the 1st grade students, %10 of the 2nd grade students and %30 of the 4th grade students can not distinguish the minor and the major goal of the department.
2. % 10 of the 1st grade students, % 8 of the 2nd grade students, % 9 of the 3rd grade students and %22 of the 4th grade students have no idea about the minor goals of the CEIT department.

3rd question: Do you believe that your department's curricula fit its goals? Are there any skills and subjects that are not included in the curriculum but you think should be?

3. % 10 of the 1st grade students, % 17 of the 2nd grade students, %23 of the 3rd grade students and %11 of the 4th grade students believe that the CEIT department fits its goals.
4. Students who don't believe the CEIT department fits its goals emphasise the following points:
   1 Biology and chemistry courses are not so important (%35 of the 1st grade students, %34 of the 2nd grade students and %29 of the 3rd grade students).
   2 Science and math courses should be in introductory level and should last only one semester (% 14 of the 4th grade students).
   3 There should be more computer-related courses (%28 of the 1st grade students, % 9 of the 2nd grade students, % 23 of the 3rd grade students).
   4 We would like to have some courses that were not offered in the previous curriculum (%19 of the 4th grade student).
   5 There should be more programming languages (%18 of the 1st grade students, %26 of the 2nd grade students, %17 of the 3rd grade students).
   6 There should be more powerful languages like C++, Java or Perl (% 11 of the 4th grade students).

7 Students find the computer-related courses as insufficient. % 28 of the 1st grade students, % 9 of the 2nd grade students, % 23 of the 3rd grade students say that there should be more computer-related courses.

4th question: What do you understand from "Instructional Technology"? What do you understand from "Computer Education"?

8 There is a considerable number of students don't know the meaning of instructional technology. At the 1st grade %29, at the 2nd grade %23, at the 3rd grade %10 and at the 4th grade %10 of the students doesn't have any idea about what the instructional technology is.

5th question: According to you, which skills and abilities a person graduated from your department should possess?

9 1st (%39), 2nd (%21), 3rd (%14) grade students believe that their department should posses programming skills. However when the grade level becomes 4th the percentage decreases to % 9.

10 As for the teaching skills, %16 of the 1st grade students, % 4 of the 2nd grade students, %12 of the 3rd grade students and %18 of the 4th grade students emphasize that their department should possess this skill.

Conclusion

The variety in the perception of major goals of the department decreases with the increase of the grade level. 3rd and 4th grade students are aware of more specific and realistic goals. Homogeneity in terms of sharing common ideas of the goals of the department increases from 1st to 4th grades. The main goal of the department is shared as "to train teachers for computers in the classroom". The way they perceive the mission and goals of the department shapes the way they define the minor or specific goals of the department. Although most of the major goals are stated there is no consistency among the perception of the students with respects the minor goals.

Until the 3rd grade the students first concern is the science courses. In the 4th grade they are more concerned with the quality of the instruction. 1st, 4th and especially at the third level there is a great variety of definitions for the instructional technology. On the other hand, at the 2nd level students concentrated on only two different types of definition. Some students cannot distinguish the difference between instructional technology and computer education.

At the 1st and 2nd grade the programming skills are perceived as the most important skills while at the 3rd and 4th grade computer literacy and computer using skills have the greatest percentage. Students at different grade levels emphasize the great variety of skills that should be possessed by a person graduated from their department.

Observations in the environment of the department it was seen that some of the CEIT students were trying to define the identity of their department. They were trying to find an answer for the question "What am I going to be when I graduate from this department?" From interviews with students it was seen that the computer (hardware and software) and Instructional technology sides of the department were favorite to educational side of the department by the students. There was a spontaneous interaction among students towards searching the identity of their department.

In the light of this finding it would not be wrong to say that there is a need for the formulation and dissemination of the departmental goals and mission. This will help the students in finding answers the question "who am I" and "what am I going to be". There might be an orientation program for the 1st grade students.

The orientation program might include the information about

- Major goals of the department
- Minor goals of the department
- Meaning of the computer education
- Meaning of the instructional technology

For further research interviews may be done with the department head and related instructors about the rationale of the courses, which are perceived as irrelevant by the students.

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Furnishing Turkish Preservice Teachers with IT Skills: Hope or Hype?

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Abstract: There is a growing demand from the schools that prospective teachers be computer literate. New teachers are expected not only to have necessary skills for using computers but also to use computers effectively to enrich their classroom teaching. These expectations have pressured teacher education institutions in Turkey to redesign their teacher education curricula. In order to respond to these pressures, the Turkish Council of Higher Education (YOK) has developed a new teacher-training curriculum for schools of education in Turkey. According to the new curriculum, a computer literacy course became a must course for all preservice teachers to fulfill the requirements for teaching credential. The main purpose of this study is to introduce and to discuss the efficaciousness of the new preservice technology-training program in Turkey.

Introduction:

Existence of high expectations from the application of new technologies is not new. Ever since people first began to use new tools and innovative methods to extend their own limited abilities, they have been confronted with the need to adapt themselves to create effective working and living environments. Especially, with the advancement of new information technologies, the way people communicate and perform at work has changed dramatically. Not only have the emerging technologies of information made possible new forms of communication and interaction in every aspects of our lives, they have also unleashed strong forces for educational reform. Now, educational institutions are primary responsible for preparing individuals for the new millennium in which IT skills will evidently have a decisive role.

Many researchers in such diverse fields as economics, sociology, organizational psychology, and education have long recognized the importance of information technology for national and institutional development. However, the term "IT" has different meanings and functions for different areas of study. For example, IT in education is perceived as not only a tool to be used for enhancing teaching and learning but may be a change paradigm in the classroom or in the educational system. Over the last three decades, instructional technology has progressed from its early emphasis on the protection and use of media and instruments of communication technology to its current concentration on the systematic approach to solving instructional problems based on theories of learning and instruction (Seels & Richey, 1994). As a result, provision of information technology in education is assessed on the bases of its efficaciousness in providing new ways of learning for both teachers and students. For instance, Means & Olson (1993) reviewed research related to use of technology in the classroom and concluded that technology:

- Often stimulates teachers to present more complex tasks and materials
- Tends to support teachers in becoming coaches rather than dispensers of knowledge
- Provides a safe context for teachers to become learners again and to share their ideas about curriculum and method
- Can motivate students to attempt harder tasks and to take more care in crafting their work
- Adds significance and cultural value to school tasks

Computer Literacy Courses for Teachers:

A number of institutions, organizations and state agencies have attempted to create sets of guidelines to determine what computer skills are necessary (or should be required) for prospective teachers. As a result of these extensive attempts, now a number of different guidelines exists.

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Luehrmann, for example claimed that, "One who is truly computer literate must be able to do computing to conceptualize programs algorithmically, to present them in the syntax of a computer language, to identify conceptual bugs, and to express computational ideas with a high degree of organization and readability" (Luehrmann, cited in Troyer, 1988, p.144).

At the other end of the continuum are those who are not in favor of including computer languages and programming into the content of computer literacy courses. Berger & Carlson (1988) criticized current computer literacy courses for heavy concentration on technical information rather than focusing on learning and instructional design theories and methods to integrate computers into the curriculum. They propose a pre-service course that is aimed at teaching the connection between instructional strategies of computer assisted instruction and the theories of learning and instructional design. Similarly, Martorella (1984) predicted that teachers do not need to know computer programming to use computers effectively as an educational tool. That view is shared by Rundall who expressed his opposition to those who are at the other end of the continuum by using the automobile analogy: "We can run a computer, just as we can run an automobile, without knowing how it works" (Rundall, 1985).

Davis (1992) developed a list of outcomes for teacher training that focuses on how to utilize technology in the classroom. Davis believed that a teacher training program should focus on increasing teachers' competencies to utilize technology effectively rather than promoting their programming skills. He further proposed that pre-service teachers should be able to:

1) make confident use of a range of software packages and information technology devices appropriate to their subject specialism and age range;
2) review critically the relevance of software packages and information technology devices appropriate to their subject specialism and age range and judge the potential value of these in the classroom;
3) make constructive use of information technology in their teaching and in particular prepare and put into effect schemes of work incorporating appropriate uses of information technology;
4) evaluate the ways in which the use of information technology changes the nature of teaching and learning (Davis, 1992).

Finally, there is an emerging perspective, which tends to view technology as a way of promoting innovations emerging from other fields of education such as curriculum development, instructional design or the theory of learning and teaching. Willis & Mehlinger (1996) think this perspective will frame the decisions and debates of the 1990s because this approach reflects a maturing perspective on educational computing.

> It does not treat all uses of computers in the classroom as equal as did so many of the research reviews published in 1980s. In addition, it does not treat educational computing as something separate from other aspects of the classroom such as the curriculum, lesson plans, and instructional design...Although this is very desirable, it will make discussions about computers in the classroom much more complex. (p. 1006)

In light of these different approaches, it is evident that the term "computer literacy" remains an ambiguous term because it means different things to different people. Tremendous development in the computer industry is also making the issue become much more complex. Even though outpacing of technology in teacher education programs has been too slow, the computer industry has been promising and providing more advanced technologies for instructional use simultaneously. Ongoing debate on the definition of "computer literacy" and guidelines for student teachers' computer competencies creates a serious debate on the contents of computer literacy courses. Each scholar determines the content of such courses based on their view of perceiving the term computer literacy resulting in confusion and lack of agreement.

Troyer (1988) reviewed a number of sources giving recommendations for the content of computer education for teachers. He noted that three topics are most frequently recommended for inclusion in teacher computer literacy training: (a) computer operation and structure, (b) educational applications of computers, and (c) software/courseware evaluation. (p. 145). Troyer (1988) also found that early emphasis on knowledge of the basic elements of programming has been losing its attractiveness among the scholars:

> Teacher computer literacy training now directs teachers to consider the methods of utilizing the computer effectively in the classroom, to evaluate available software, to use the computer as a tool in accomplishing record-keeping and managerial tasks, and to consider the larger impact of computer technology on society and education. (p. 146)

There is a number of researchers who firmly believe that computer literacy is a matter of individual organizational need. These scholars claim that we should focus on what is important to student teachers rather than pondering the glut of computer skills available. Moont (1987), for example, criticized that we are spending too much time and effort on the definition of computer literacy rather than teaching. Sheffler (1986) summed up the philosophy of computer literacy when he claimed "the challenge confronting teachers is to adapt whatever advantages computer use may be shown to offer, while holding fast to their independent vision of educational values" (Sheffler, cited in, Kay, 1989).

Higdon (1994) claims that each school for teacher training develops its own criteria of proficiency level in computer literacy and these imposed computer proficiency levels are achieved by pre-service teachers for credit but are not necessarily functionally learned. He further proposes that the pre-service teacher needs to be impressed with the social, economical, and cultural factors along with the empowerment that come with computer literacy. (p. 436).

Constructivist theory defines learning as a dynamic and continues process that must be sustained and strengthened by a multiplicity of experiences from which students then construct their own experiences and explanations (Jonassen, 1994). As constructivist approach receives wider acceptance in the field of teacher education, some teacher education institutions attempt to increase the emphasis on experience in the schools and decease the emphasis on lecture/discussion and computer lab components of the course by promoting student teachers' field experience (Burson, 1995).

Rodriguez (1997), for example, suggested that some of the general guidance in constructivist literature can be applied to technology training for teachers. Rodriguez proposed five constructivist strategies that can be used in technology training. First, he believed that constructivism and cognitivism complement each other and these two approaches should be merged. He further suggested requiring students to exert their mental effort in support of generative learning while providing explicit instructional support to avoid information overload in short-term memory. Second, he emphasized the importance of focusing on learners and their needs. He advocated that keeping students engaged through active participation and maintaining students' sense of relevance concerning course activities are critical. Focusing on the essence is another strategy that Rodriguez proposed. He argued that grasping the essence, students can then literally accomplish more complex tasks with the instructor's guidance, thus developing their understanding as they grapple with more complex problems. Fourth, he advocated that learning under the constructivist view is a communal activity. Even though teacher trainees need time to develop their technological skills on an individual basis, they often enjoy providing informal assistance to each other. Finally, the last strategy concerns reflexivity-learners' awareness of their role in constructing knowledge. He suggested that the instructor's role is to be one of ". . . engaging the student via questioning and prompting so that the student assumes responsibility for acting to solve the problem. Reflection and action, then, support construction of new knowledge" (p. 1309-1311).

Keizer and Wright (1997) describe how a basic computer course should be designed by using constructivist strategies, which are proposed in the previous study. First of all, the researches suggest that the course should be redesigned with a shift from whole-class to small-group instruction, from individual to tutorial instruction, from lecture to coaching, from summative evaluation to performance assessment, and from isolation to cooperative learning. The curriculum should be based on major concepts rather than a long list of objectives; it should focus on competencies rather than meeting externally imposed criteria. The classroom is to be more learner-oriented and less teacher-centered. The basic framework for the course should be changed from large group lecture and individual practice to teaching practice based on coherent themes, reflection, and relevant contextual experiences. Finally, faculty should give students guidance but not step-by-step instruction so that students can explore the computer applications through tutorials at individualized speeds and engage in authentic, real-word projects (p. 210).

It is obvious that the term "computer literacy" and "the content of computer literacy courses" have been modified according to developments in the field of technology and teacher training. In its beginnings, computer literacy addressed an understanding of hardware and software development. The student was expected to know the parts of the computer both internal and external. In addition, the student was required to become conversant in programming languages since it was necessary to know the language to get the computer to do many required tasks. As user-friendly computers and software become more available in education, the term computer literacy became more application oriented. Accordingly, an evolutionary change also took place in outlining the content of computer literacy courses. Computer literacy courses became more application oriented and the learners were prepared to use computers and software rather than to learn how to program them. Finally, computer literacy is now perceived as a tool for teachers to reform the way they teach.

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Characteristics of Effective Preservice Technology Training:

Teachers will play a decisive role in how successful the integration of technology will be in education. It is evident that the investment in technology cannot be fully effective unless teachers receive necessary training and support to become fully capable of using these technologies.

A large body of research points out that technology should be integrated across the entire teacher education curriculum to be effective. Most teacher educators admit that one required computer literacy course for educators is of limited value if it is isolated from the rest of the teacher education curriculum (Yildirim, 1999; Yildirim & Kiraz, 1999). For example, Novak & Knowles (1991) examined beginning elementary teachers' use of computers in classroom education. They discovered that computer usage was not emphasized in their first year of teaching experiences because new teachers viewed computers as "extra" and "special," not as general tools to enhance the instructional process. This study supports the position that technology training needs to be integrated into the entire pre-service teacher education program so that pre-service teachers accept it as a means to enhance teaching and learning.

Effective technology training has four common characteristics that can be traced in the literature:

(a) educational technology training needs to be integrated into the entire teacher education program so that effective technology integration is modeled for pre-service teachers;
(b) the training should link technology with curriculum;
(c) the training should provide hands-on practice so that teachers become comfortable with them; and
(d) the training needs to be in-depth (Dell & Disdier, 1994).

Integration of IT into Preservice Teacher Education Programs in Turkey:

The Turkish Council of Higher Education (YOK) is responsible for the planning, coordination, and supervision of higher education in Turkey. Parallel to the international practices in reforming preservice teacher education for the new millennium, the Turkish Council of Higher Education has developed a new teacher training curricula for schools of education in Turkey. According to the new curricula, a computer literacy course became a must course for all preservice teachers to fulfill the requirements for teaching credential. This new course is designed to improve and enhance teachers' IT skills.

The main purpose of this course is defined in the new curriculum as to teach basic computer skills and introduce teachers to several commonly used computer applications such as word processing, spreadsheets, databases, telecommunications, and presentation programs. However, as described in the curriculum, preparing teachers for the use of these technologies into their classroom teaching is not among the course goals. Even though earlier practices of preservice technology training clearly ascertained that one computer literacy course is not of a high value unless computers are integrated into the whole teacher education program.

Even though this computer specific course is the first attempt at preparing Turkish preservice teachers to use computer technologies in the classroom, this effort should go beyond only training the teachers on basic computer skills. If the Turkish Council of Higher Education is to prepare teachers for the 21st century, the Council should recognize the need for providing other courses concentrating on instructional strategies to promote teaching with the computer in the classroom. In addition to that the content of "Methods of Teaching" courses can be reorganized to introduce new teaching methods including those incorporating the computer. As a result of this reorganization, schools of education will not only be training preservice teachers on technology but they will also be training preservice teachers on teaching with technology.

It is a fact that teachers teach as they have been taught, and it is unlikely that they will integrate computers into the classroom teaching unless they see their faculty using computers to teach. Therefore, it's also of the essence for faculty to promote "teaching with technology" in their classrooms.

Conclusion and Recommendations:

It is obvious that requiring a computer literacy course for preservice teachers to fulfill the requirements for teaching credential is an important step for the Turkish Council of Higher Education. It is because this required computer literacy course will make teachers more at ease with using applications, help them gain more confidence in using computers, increase their awareness of computers and its applications. However, the related literature on the preservice technology training indicates that "teaching with technology" is more than "using technology." Therefore, preservice teacher training programs of Turkey should be reorganized in accordance with the following principles.

- technology should be infused to entire teacher education program,
- technology should be introduced in context, and
- students should experience innovative technology-supported learning environments in their teacher education programs (Davis, 1999).

In order for the Turkish Council of Higher Education to successfully redesign preservice technology training programs, the following recommendations are offered:

1. Even though every preservice teacher is now mandated to take this required computing course, the value of this course is limited unless computers are integrated into the entire teacher education curriculum. Therefore, the Turkish Council of Higher Education should take the initiatives to employ new policies to incorporate technology into teacher education curricula outside of computer literacy or instructional technology courses. One of the most effective policies for incorporating technology into the whole program would be the integration of technology in teaching methods courses.
2. Needless to say, faculty of teacher education programs will play a decisive role in how successful the integration of technology will be in education. Therefore, they should demonstrate their competency and willingness to use technology in teaching. They should be role models for prospective teachers in integrating technology into the classroom teaching.
3. However, faculty of teacher training programs will need constant assistance from the educational technology experts in developing their hardware and software skills. Therefore, the Turkish Council for Higher Education should develop new policies to make this assistance available.

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PRESERVICE TEACHERS' PERCEPTIONS OF COMPUTER: TIME DEPENDENT COMPUTER ATTITUDE SURVEY

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Abstract: The purpose of this study is to determine time dependent computer attitudes of preservice teachers at the College of Education at Karadeniz technical University, Trabzon, Turkey, in an entry-level computer course. The focus of this study is to determine whether the gender and length of computer usage influence attitude of preservice teacher toward computers. Our results shows that gender do not appear to significantly influence attitudes toward computers. However, the length of computer usage do influence attitudes toward computers.

Introduction

One of the great challenges facing today s education system is the computer revolution in education. There is a need for preservice education programs, which emphasize integration of computer use in subject content areas and individual curriculum units. Beginning in 1982, Turkish Government introduced a series of funding initiatives to promote the use of information technology in schools. Applying information technology to effective learning and teaching all keys learning areas is the current Turkish education policy.

Teacher education faculties in Turkey have grappled for years with the challenge of preparing teachers to integrate technology using a variety of different approaches. Some components of the knowledge and skills required for teaching with technology are assessed with reasonable confidence. These include technical skills such as the operation of hardware or software and knowledge of relevant curriculum and policy documents. These teacher education faculties have been giving graduates with these capabilities for several years. However, this capability does not translate into more or better integration of computer technology into teaching. There are factors other than technical knowledge and skill, which contribute to teachers success at technology integration in their teaching.

Positive teacher attitudes toward computers are recognized by researchers as a necessary condition for effective use of information technology in the classroom. (Poling, 1994) asserted that students feel as if they are dragged, kicking and screaming into the realm of computers. Hakkien evaluated how a computer course affected the anxiety level, computer attitude, and feelings about computers of 29 first year education majors (25 females and 4 males). Sinclair s results indicated that as familiarity with the computer increased, computer anxiety levels decreased and attitudes improved. The other study compared education students in a computer course with a control group. Students who had taken the computer course had lower anxiety scores and higher self perceived ability than those who had not (McCoy & Baker, 1994).

At the College of Education at Karadeniz Technical University (KTU), Trabzon, Turkey, all education majors take an entry-level computer course entitled as Introduction to Computers . This course covers basic computer concepts, word processing, spreadsheet, and database. The course ensures that all educators can use information technologies to improve student learning, support effective teaching, and enhance overall teacher productivity. Students in all majors of college of education are required to take this course. However, many enter the course with anxiety due to limited use of the computers. Researches suggest that negative attitudes and unfavorable perceptions of computers adversely affect computer literacy.

The purpose of this study was to investigate preservice teacher s time dependent attitudes and perceptions about computers in an entry-level computer course. This study attempted to address the following questions:

- What are preservice teachers general attitudes toward computers?
- Do variable such as gender effects preservice teachers attitudes toward computers?
- Do length of computer usage influence preservice teachers various attitude domains?

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Method and Instruments

Participants were pre-service teachers who were enrolled in undergraduate entry-level computer course in the spring program at the college of education in 1999. The study examined the computer attitudes of 78 preservice teacher majoring in science education in an eight-week computer course. Further, these attitudes were studied in relation to gender and length of computer usage.

The instruments used in this study were a) Interview Questionnaire, and b) Computer Attitude Survey.

a) Interview Questionnaire: Participants were interviewed to gather data and to determine their computer experience and preferences. This survey was given to students at the beginning and at the end of the computer class.

b) Computer Attitude Survey: To determine preservice teachers attitudes toward computers, subscale of Computer Attitude Measure (CAM) (Kay, 1993), was translated to a Turkish version and utilized in this study. These attitudes included personal attitudes and also application of those attitudes to teaching situations. This survey was given to students every week to determine weekly changes in attitudes toward computers. The following is the CAM subscale:

ATTITUDE ABOUT COMPUTERS

Please mark an X on the line, which closest indicates your choice.
Computers are

1- Unlikable _ _ _ _ _ _ _ Likable
2- Unhappy _ _ _ _ _ _ _ Happy
3- Bad _ _ _ _ _ _ _ Good
4- Unpleasant _ _ _ _ _ _ _ Pleasant
5- Tense _ _ _ _ _ _ _ Calm
6- Uncomfortable_ _ _ _ _ _ _ Comfortable
7- Artificial _ _ _ _ _ _ _ Natural
8- Empty _ _ _ _ _ _ _ Full
9- Dull _ _ _ _ _ _ _ Exciting
10- Suffocating _ _ _ _ _ _ _ Fresh

Computer Course

The required computer course was taught in a computer lab by an experienced computer instructor. The content covered in the computer course include basic computer literacy tasks: 1) knowledge about computer hardware and software, 2) skills of using and exploring programs, and 3) ability to apply software features to produce the desired result.

The computer application classes are structured so that participants are engaged in hands-on activities to gain insights about how computers can be used to improve teachers efficiency and productivity.

In the first week students were introduced to basic computer terminology and gained knowledge about computer hardware and software.

In the second and third weeks students are required to demonstrate their skills in several word processing tasks. These included creating a word processed documents, retrieving and editing a file, setting new margins, changing the size, type, and style of fonts, and aligning text. They were instructed to change a document s line spacing, center a line of text, move text, and insert or delete text where necessary. The final tasks were to print the documents and save them as files on the diskette.

In the forth and fifth weeks, to demonstrate competence with spreadsheets, students were asked to create a spreadsheet file. After the spreadsheet was created, the students had to increase the width of a column, edit a cell, use a function to calculate the average, and create a bar graph. The students were printing a copy of the spreadsheet and save their work on the diskette.

In the sixth and seventh weeks, in the database section the students were required to create, edit, and sort a database records. Students were directed to create a database using the fields and data that were provided. They were then instructed to edit a record, delete a record, sort the database according to specific criteria, and print the records. The students were then asked to create and print a report and save their databases on the diskette.

In the last week, students were instructed to use presentation program, Power Point. They were asked to create a new slide, add a color, picture and animation, and apply styles to their slide. The students were then directed to create a slide show. The final tasks were to print slides and save their work on the diskette.

Procedure

At the beginning of the computer course the purpose of the surveys was explained to the students. They were told that their responses would facilitate course revisions as well as provide a measure of the effectiveness of the course. Interview Questionnaire was administrated to participating students prior to and after eight weeks and data about their computer experiences and preferences were collected. Interview questionnaire contained short survey about basic technology competencies that are needed by educators. The students are asked to give an overall rating of their competency within each of the five domains (1) basic computer operation skills; 2) word processing; 3) spreadsheets; 4) databases; and 5) media communication) Participants are instructed to self-assess using a four-point scale (Very competent to Not competent).

On the computer attitude survey respondents were asked to indicate the degree to which they agreed or disagreed with each statement by circling the appropriate number from 1 to 7 (number 1 indicated negative attitude and number 7 indicated positive attitude toward each statement). This survey was give to students at the end of every week to determine weekly changes in attitudes toward computers.

Results and Discussion

Results revealed that 8 of 78 students owned a computer, 35 of 78 students were female and 45 of 78 were male.

The results of Interview Questionnaire that is administrated at the beginning of the computer course showed that students assessed themselves Not competent . Overall rating of their competency within each of the five domains ranged from 1 to 1.57 as it is shown in Tab. 1. After the computer course students self-assessment scores increased.

Computer Competency	Pretest	Posttest
Basic Computer Operation Skills	1.57	2.19
Word Processing	1.28	2.89
Spreadsheets	1.19	2.8
Database	1.11	2
Media Communication	1.04	1.3

Table 1. Results of Interview Questionnaire

The results of weekly variations of attitudes about computers are shown in Fig. 1 for both boys and girls. The weekly variation of each attitude is presented from (a) to (j) in Fig. 1. The following general observations can be done about Fig. 1: In general, both boys and girls responded positively for each attitude it seen from Figure. So, students (boys and girls) think that computers are: likable, happy, good, pleased, calm, comfortable, natural, exciting, fresh and full. There are some weekly variations of these answers as it seen from Figure. In general, for every week students responded more positively to all attitudes except in the third week and the week before last week (in the seventh week). In these weeks there is a slight decrease in the positive responses. The reasons for this can be attributed to the homework that was assigned to them at the end of the second week and the final exam, which was announced the week before last week. Again the differences between the responses of boys and girls are not significant in general. But Fig. 1 shows that the assigned homework at the end of the second week affected boys more than girls which is seen as a sharp decrease in boys graphics in Fig. 1. On the other hand the Figure shows that the final exam effected boys and girls almost the same.

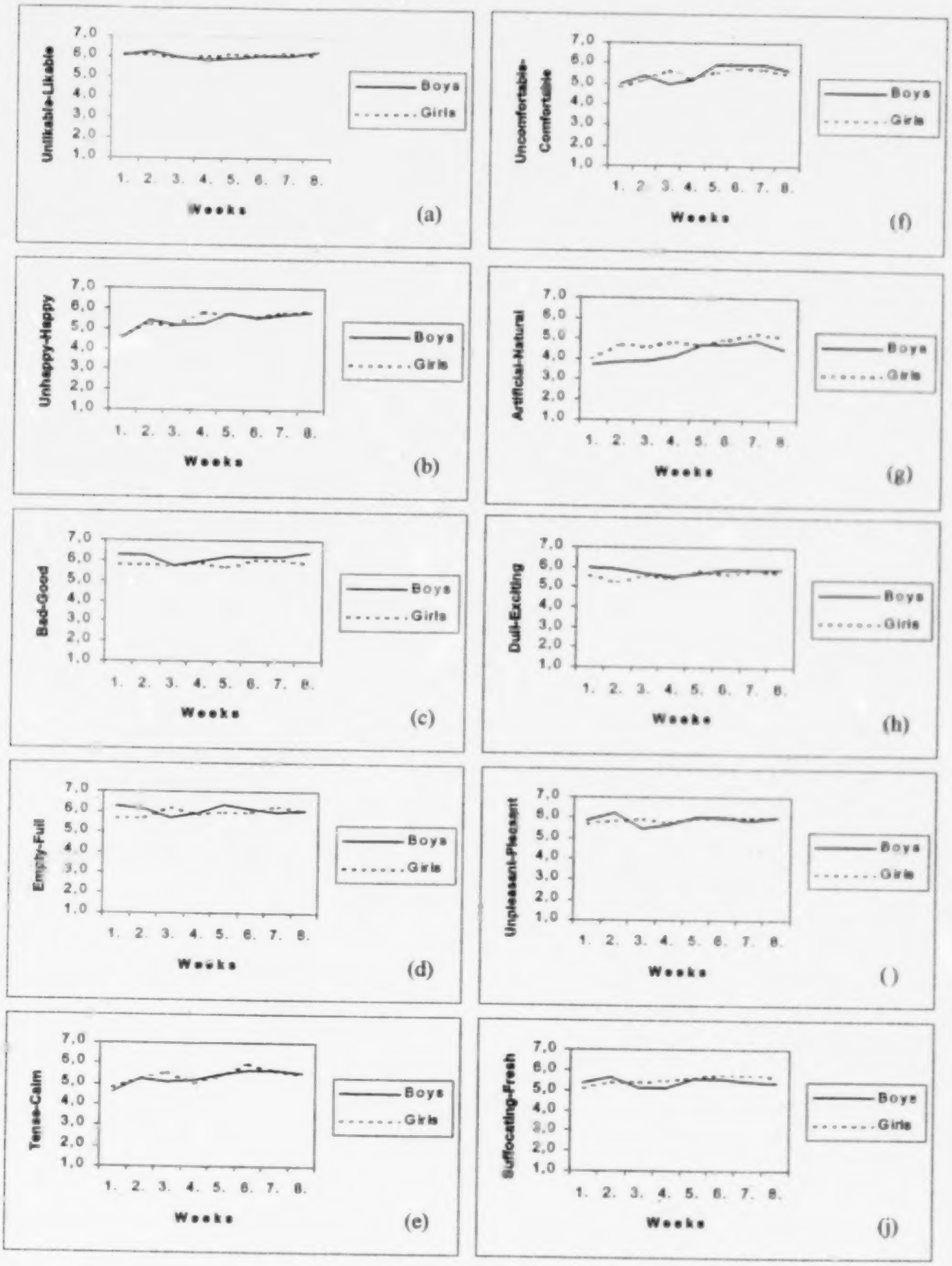

Figure 1. The results of weekly variations of attitudes about computers

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Ukrainian Teacher Education in Transition: What Role Can Technology Play?

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Abstract: The paper presents a critical analysis of teacher education reform in Ukraine. The author discusses the educational legacy of the Soviet period, major changes in teacher education, which resulted from general educational reform, and current needs of Ukrainian teacher education. The author argues that teacher education reform has so far succeeded in correcting the most obvious vices of the inherited education system. Further development of the reform should be aimed at altering the fundamental ways in which the system is organized. The successful accomplishment of this task is possible only on condition that all central dimensions of the teacher education reform, namely, teaching materials, teaching approaches and belief systems, undergo profound change. The expansion of teacher education reform can be ensured through the use of technology, which has a potential of becoming an important means of altering teaching strategies and beliefs.

Introduction

Like other countries, which emerged after the collapse of the Soviet Union, Ukraine is living through a period of profound transformation. Formerly part of a totalitarian state, it is slowly but steadily acquiring its own identity. A central role in this process belongs to education. The new Ukraine needs people who have been trained in the ways of the new social and political environment. Therefore, creating an educational system, which can help young people meet the challenges of the new, emerging democratic society, is a goal of utmost importance. Success in achieving this goal depends, to a great degree, on the quality and commitment of the teaching force.

This paper will focus on the current state of pre-service and in-service teacher education in Ukraine. Beginning with a brief description of the Soviet period legacy, the paper will shift to examining the major changes in teacher education which resulted from the implementation of the national policy in the field of education. It will then describe current needs in teacher education in Ukraine. Finally, the paper will consider the role, which technology can play in building up teacher education system, which will produce thoughtful, creative, independent specialists, who have clear understanding of inherent values of education for democracy and are willing to participate in the renewal.

The Soviet Period Legacy

A reform is correction of a wrong, of errors. Therefore, we shall start our analysis of changes in teacher education in Ukraine with a description of the Soviet period legacy.

The structure and content of teacher education in the Soviet Union was mainly shaped during the late 20s and underwent but rather insignificant changes during the Soviet period (Webber, Webber, 1994).

Pre-service teacher training in the former USSR was realized in both higher and non-higher, or secondary, educational institutions. Most secondary school teachers were prepared in higher educational institutions: pedagogical institutes and "classical" universities. These institutions also trained teachers for schools for physically and emotionally handicapped children , as well as children with learning disabilities. Most primary school and pre-school teachers received their training in non-higher educational sector, the so called pedagogical schools and technikums, though a substantial proportion graduated from teacher training institutes. Higher educational institutions admitted applicants who had completed secondary education, pedagogical schools and technikums could be entered by people with either complete or incomplete secondary education. In the latter case students received their secondary education along with teacher education.

Most higher educational institutions offered five-year programs, which prepared for teaching two subjects. Many of them also offered courses by correspondence, evening courses or both. Students taking such courses had to take an additional year to study and unlike the full-time students prepared to teach only one subject. Pedagogical schools offered two- or three-year programs for students who had completed secondary education and three- or four-year programs for students with incomplete secondary education.

The curriculum in both higher and non-higher teacher education institutions was fairly standardized. The elementary and pre-school teachers took compulsory courses in Russian language and literature, mathematics, history, natural sciences and teaching methods. Pre-school teachers did language development, singing, sculpting, and drawing. Students of pedagogical schools also learned to play musical instruments.

The curriculum in pedagogical universities consisted of three interrelated components: content area, social disciplines (scientific communism, Marxist-Leninist philosophy, political economy and history of the Communist Party of the Soviet Union) and pedagogical disciplines (pedagogy, history of education, educational psychology, school hygiene and methods of teaching the student's particular content area). Also all student teachers had to take physical education and nursing (female students) or military training (male students).

An integral part of the curriculum in both higher and non-higher teacher education institutions was practical application of what the students learned. In the first years of study students were involved in extra-curricular activities at schools and worked in children summer camps. Later they did full-time student teaching under the guidance and supervision of teacher educators and on-site secondary or primary school teachers. Prospective teachers of biology, chemistry, and physics also had to do an industry practicum.

Upon graduation teachers were assigned to schools where they were required to work for at least three years before they could move to another job.

The in-service teacher training was realized in Institutes for Higher Pedagogical Qualifications and Institutes for Teacher Development, which offered short courses dealing with a specific content area and with certain topics in pedagogy. Teachers were required to have such retraining every five years. The participation in these courses was a necessary prerequisite for improving teaching qualifications.

This system of teacher education ensured significant educational accomplishments, for example very high literacy levels and great successes in the sciences and technical education. However, being designed to serve the needs of an authoritarian state with its command style economy it emphasized the values, which were opposite to those characterizing a democratic society. The major features of the system may be summarized as follows:

- State monopoly in the field of education. There were no private or denominational educational institutions in the USSR.
- "Rigid uniformity" (Webber, Webber, 1994). The system was universal with no diversity in region with markedly different history, culture and traditions.
- Heavy politicization. It was considered that the teacher's primary role was that of ideological educator (Webber, Webber, 1994), which explains, for example, why social sciences carried more weight in teacher education programs than pedagogical disciplines.
- Centralization. It was a hierarchical bureaucratic structure, in which all curricular, methods, objectives were issued by the Ministry of Education.
- Subject-centered approach. Teachers saw their aim in imparting and students in memorizing factual subject matter. Therefore, the system emphasized didactic and expository methods of instruction and paid little attention to building up higher cognitive skills.
- Low quality of philosophical and pedagogical culture. Pedagogy was separated from philosophy completely. This accounts for insufficient attention to the development of student teacher personality. Teacher education was concerned in the first place about preparing students with encyclopedic knowledge of different subjects and emphasized conformity rather than developed independence, leadership, creativity, critical attitude, willingness to take risks, tolerance to different opinions or responsibility.

The political change in 1991 generated fundamental social and economic transformation of the society and stressed the need for a different type of educational system, which could provide young people with the knowledge, attitudes and skills to be flexible, adaptable, and self-reliant.

Ukrainian National Policy in the Field of Education: Major Outcomes

Ukrainian national policy in the field of education began taking shape soon after the country proclaimed its independence. Its main directions were first defined in the Education Act of Ukraine adopted in June 1991 and were later instantiated in the Law on Education of Ukraine (1996) and in the Law on Secondary Education (1998). From the very beginning Ukrainian national policy was directed towards improving considerably the quality of education, integrating it with international educational practices, and reviving the people's national identity. Now, nine years later, we can see concrete results of its implementation.

The most visible aspect of change is a structural reform. The past decade has been marked by the establishment of private education institutions and the development of fee-paying higher education. Many teacher education institutions have changed their status, for example, according to the Law on Education of Ukraine former pedagogical schools now provide basic higher education. A number of pedagogical institutes have been transformed into pedagogical universities. This process was accompanied by considerable course diversification, which was motivated not solely by teacher training considerations but by student demands and needs of local and national economies.

Recent years have also been marked by the development of a multi-level system of pedagogical education. Now teacher education students may receive incomplete or basic higher education at Bachelor's level and complete higher education at Specialist's or Master's level. Pedagogical colleges offer programs which lead to Bachelor's degree, pedagogical institutes run Specialist's degree programs, and pedagogical universities grant Specialist's and Master's degrees.

Although higher education system of Ukraine is still regarded as highly centralized (Savchuk et al., 1997), higher education institutions have been given certain amount of autonomy. Subject matter and course structure are still decided by the Ministry of Education, however, teacher education institutions can now offer courses of their own choice, in accordance with the possibilities, which they have at their disposal, and regional peculiarities. Teacher educators also enjoy more freedom to choose textbooks and teaching materials.

Another result of educational reform is depoliticization of teacher education. Heavy ideological orientation of the system and rigid ideological control were brought to an end. New courses have been introduced, for example, sociology, logic, history of Ukraine. The content of the existing courses has been significantly updated.

National educational policy has also led to a wide spread of complexes, which consist of universities and gymnasiums or/and colleges, where different phases of teacher education are brought into closer contact with one another.

The scope of changes achieved in a relatively short period of time is impressive. However, this immediate correction of the most obvious faults of the inherited teacher education system is no more than a beginning of educational reform. To ensure its success more comprehensive mechanisms of change are needed, above all, careful strategic planning.

Have We Learned Our Lessons?

During the Soviet period there were two attempts to substitute the authoritarian, content-based education system with a humanistic, student-centered one. The first attempt was initiated by the educational authorities under Anatolii Lunacharskii immediately after bolcheviks came to power in 1917. The second one was advocated by the USSR Ministry of Education during the years of Perestroika. Both initiatives were enthusiastically met by broad-minded educators in the former USSR and abroad, but neither brought the desired results. It would be oversimplification to assign the failure of the reforms to a single factor. But it is not an exaggeration to say that an important part in burying these bold initiatives was played by lack of attention to the task of preparing agents of the reforms. In both cases reformers did not understand, did not take seriously or overlooked the problem of resistance of the teaching force. They obviously acted from naïve theories of change, believing that long established practices could be altered through sanctions, exhortation or new courses in the curricular. Reforms were conceived not as multidimensional processes (Fullan, 1991), but rather as single events. Such an approach explains the choice of strategies of change which neglected addressing all three dimensions, which M. Fullan considers central to any educational reform, namely, materials (regulations, curricular, technology), teaching approaches (teaching strategies, activities, techniques), and beliefs (pedagogical assumptions, theories, which serve as basis for new programs) (Fullan, 1991). Although implementing just one or two of these dimensions, for example, introducing new courses without altering teaching strategies, or adopting new techniques without understanding the conception which underlie them, can accomplish certain educational objectives, but it cannot lead to fundamental change of the education system. Issuing new regulations, developing new materials and providing new resources are the most visible part of the reform and at the same time the easiest to imply, but they allow no more than improving the quality of what already exists. Changing teaching approaches and belief systems is much more difficult and requires continuous application of efforts. However, it is the development of the new teaching skills and provision of conceptual understanding of reasons for and main objectives of educational reform that makes the reform irreversible.

The lesson to be learnt from the two unsuccessful attempts of educational reforms mentioned here is that a precondition of a successful general educational reform is a reform of teacher education. The latter requires special attention and should be regarded a task of utmost importance if general educational reform is to have a chance to succeed.

Current Needs

The changes in teacher education achieved so far have resulted from the implementation of the general educational reform. Although these changes provided correction of the most obvious faults of the educational system, which Ukraine inherited from the USSR, they have not altered the fundamental ways in which it works. Therefore, there is a need to back up building a system of teacher education for democracy with a philosophy of change which would address both the content and the process of teacher education reform. It is important to ensure that educational change moves beyond issuing new regulations or revising materials. This does not mean that structural reform has achieved all its objectives. On the contrary, teacher education is in great need for new textbooks, curricular materials, computer hardware and software. But new laws or modern technology do not necessarily translate into significant improvements in pedagogy. They work or fail depending on whether or not they are based on changes in conceptions and teaching strategies. This means, for instance, that teachers need to be brought to grips with the inherent values of a democratic system and the nature of the teaching process in a democracy. They need to learn how to develop courses, which would fuse content learning with the development of student cognitive skills. They need to acquire practical skills in organizing and running schools in a democracy.

An important characteristic of the present reform is the enthusiasm and willingness to change felt by the majority of teachers, which is revealed, for example, in increasing numbers of "alternative" schools. This positive motivation for change needs to be fostered and teachers who struggle to ensure the success of educational reform should be provided with necessary skills and competencies as well as administrative support and resources.

The past few years have been marked by the development of a new tendency in teacher education map in Ukraine, namely, growing importance of provincial universities in pre-service and in-service teacher education. More and more school graduates who consider teaching as a career and people who already have higher education but want to be retrained as teachers enter provincial rather than central teacher education institutions (Gluzman, 1997). The faculty in provincial teacher education institutions also demonstrates greater commitment to their profession, while teacher education institutions located in big cities are becoming more like general universities, often dropping the focus on teacher preparation entirely. This brings forward the need to turn provincial pedagogical universities into regional centers for pre-service and in-service teacher education. The implementation of this strategy requires careful planning and state funding as unlike the advanced central higher education institutions most provincial universities have seen very little change recently as far as modernization of teacher education is concerned.

This list of need is far from being complete. I have just described those, which, in my opinion, require immediate attention.

What Role Can Technology Play in Teacher Education Reform?

Most teacher education institutions, in particular those, which are located in provinces, have but limited technology resources. Nevertheless, these resources could help to achieve an important breakthrough in teacher education reform, provided they are put to good use.

As has already been emphasized, educational reform is a multidimensional process. Change in materials is relatively easy to employ, changes in teaching strategies and belief systems present immense difficulties. However, if fundamental educational change is to be achieved, it is essential that all three dimensions - what teachers use as well as what they do and think - be altered in actual practice. It is in expanding educational change to cover up teaching strategies and beliefs that I see the primary role of technology in teacher education reform. Technology can ensure reform expansion in a number of ways:

- Providing continuous personal access to new ideas, which is a necessary condition for becoming aware and following up on innovations (Fullan, 1991).
- Providing opportunities for open ongoing interaction among teachers focused on educational reform implementation. Interaction is regarded the prime basis for social learning (Fullan, 1991). Expanding the scope of interaction, letting it go beyond one school or district may accelerate the acquisition of new concepts, new behaviors, new skills and new beliefs considerably.
- Letting external facilitators into the educational reform. Educators in Western Europe and in the USA have considerable first-hand experience of education for democracy. They may provide invaluable assistance helping Ukrainian teachers become aware of the existence of new approaches, choosing among a range of new practices, deciding on suitable evaluation. This interaction may provide Ukrainian teachers with important insights into the nature of education for democracy.
- Providing access to innovative educational materials (sample lessons, teaching tips) and resources.

While technology is not the only factor affecting educational change, it may play a key role in its successful implementation.

Conclusion

Analysis of teacher education reform in Ukraine gives reasons for optimism as well as for pessimism. On the one hand, there are obvious successes in dealing with the faults of the inherited education system. On the other hand, we face lack of strategic planning for educational change, which may eventually allow the system to remain essentially untouched. Whether teacher education reform will end up at the structural reform phase or move beyond it depends on a number of factors. One of them is technology. Hopefully, its potential will be used to its fullest.

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TEACHER EDUCATION IN RUSSIA: HISTORY AND TRANSITION

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Abstract: To say that Russian educational system is currently in transition is an understatement. More than ever before higher education in Russia and teacher training as its integral part is responsive to societal changes. The massive pressure of the technology revolution has created conditions that have greatly transformed the nature of academic life, the content of learning, and the roles of educators. The paper presents an effort to analyze the current situation in Russian teacher education considering both external and internal forces affecting the system. It also focuses on the issue of educational technology within the system of teacher training.

Introduction

To speak about changes and transformations the Russian teacher education is facing today is better through examining and analyzing its basic features from historical and contemporary perspectives. The following aims to track both the traditional Soviet and the reformed Russian teacher training system.

Teacher Education in Soviet Russia

Pre-service education

The structure of pre-service teacher education in the former Soviet Union resembles that of systems in many Western European countries. Traditionally a university diploma has been a license to teach. However, teacher training in the Soviet Union was not limited to university level: only 10 percent of teachers were prepared at the universities.
By the early 1990s, pre-service teacher training in the Soviet Union had been provided by three types of educational institutions:

1. specialized pedagogical schools,
2. pedagogical institutes,
3. universities.

Pedagogical schools still function in Russia today, specializing in preparation of preschool and elementary school teachers. The admission to pedagogical schools is based on either nine or eleven years of study in secondary school. The curriculum is mostly focused on methods of teaching and study of education. The course of study varies from four to two years, depending on the educational background of the students. Nearly three fifths of the course is devoted to core subjects and methodology of teaching them Theoretical professional training is combined with practical work during the first years and a teaching practice in the final year.
Pedagogical institutes, which were equivalent to university level institutions, and some departments of *universities* originally trained the students intended to teach in secondary schools. The course of study in both institutions was five years. The major *difference* between institutes and universities was in the curriculum, in other words in the existing balance between subject matter and educational studies. Traditionally pedagogical institutes paid greater attention to methodological and educational issues and provided more in-service training than universities did. The emphasis was placed on the preparation of professionals qualified to work as teachers. The universities focused on preparation of scientists and researchers rather than educators. The common feature for both types of higher educational institutions was that the variety and number of courses taken by students were based on the standard curricula and were mandatory.
In the 1970s departments for training preschool and elementary school teachers were established

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in pedagogical institutes. It was an attempt to provide elementary schools with higher education institutions graduates. This implied that specialized pedagogical schools would be gradually replaced by pedagogical institutes, but it didn't happen. In spite of the differences between the ways future teachers were trained in pedagogical institutes and in pedagogical schools some school principals believed that elementary school teachers graduating from pedagogical schools were better prepared for their work than those graduating from the institutes. (Holmes et al. 1995). The former had more practical experience in their work than the latter due to the fact that in the institutes theory courses dominated the curriculum. Thus, by the early 1990s the above described institutions provided all Soviet schools with teaching personnel.

In-service Professional Development

In-service teacher training has been traditionally a significant part of the entire educational system. Every five years elementary and secondary school teachers had to take refresher courses, provided by teacher development institutes. These courses focused on specialized and advanced study in each core subject, as well as innovative teaching methods. Similar courses were organized by professional development departments for university faculties.

School teacher qualification system responded to teachers' academic background, professional accomplishments and teaching experience. To be promoted to the higher category, which would result in salary raise, they had to pass challenging examinations in educational studies and subject area, present a teaching portfolio and conduct a series of demonstration classes.

Teacher Education in the Reform Period

The international trends to raise the status of teacher training to a professional level became one of the decisive external factors in reorganizing and restructuring the existing types of teacher training institutions.

Since early 1990s Russian institutes have been gradually reorganized into universities, and pedagogical schools into colleges. Besides, an ever increasing number of new private educational institutions have emerged.

Today's financial crisis in Russia has seriously effected its academic life. All over the country pedagogical institutes merge with technical institutes into classical universities. The main purpose of this reform is to reduce the number of higher education institutions in order to survive in crisis. Thus, by August 1994 among 141 newly established universities, 46 were classical (Lugachyov et al. 1995).

A great concern here is that under the crisis and reduced finding from the Federal Government such transformations can lead to teacher education downgrading, due to the introduction of new programs, other than teacher training, but based on student fee. To survive and successfully compete with those, teacher training programs should be significantly reorganized.

Internal forces for change have been equally important. In newly established universities the teaching staff has been given greater freedom to design the curriculum. Having preserved national standards as unified test model, the universities are trying to take complete control over curriculum development and introduce new independent research topics and students' choice.

Moving Towards Technological Society

Russian teacher education system is currently in transition. One major shift that can be already seen is the greater focus given to preparation of educators for the future.

As the 21st century approaches, emphasis on technology has increased. It is known to improve opportunities for learning, to enrich teaching, and to strengthen the society. Unfortunately, teachers' acceptance of educational technology is not increasing as rapidly. Thus, Russian teacher training system has been slow to respond to the potential of the technology now available. Despite its importance to teacher education, technology has not become a core part of the teacher training programs in most institutions. There is an urgent demand to substantially expand the use of technology in teacher training curriculum, which will help future teachers to become technically literate to be effective in the classroom.

These demands for the broad integration of technology into the teacher training system are increasing throughout the world. Some nations, e.g. the United Kingdom, respond to them by including the use of technology in core subject teaching within Teacher Training National Curriculum (Davis 1998). Such initiatives tend to emerge everywhere. Also exemplary is the experience of US higher education in incorporating technology in teaching . Such international parallels are a matter of comparative study and might help Russian teacher training .

Technology and Russian Teacher Education

Although no solution for financial and social problems of Russian educational system , technology plays a crucial role in its restructuring and updating.

The integration of technology into Russian teacher training curriculum would allow:

1. to meet the requirements of today's "information society";
2. to resist in the struggle for surviving with non-teacher training departments;
3. to update currently existing curricula and create a richer learning environment for students;
4. to improve teachers' professional efficiency.

The challenge to implement these changes into Russian teacher education is great, but so are the advantages. The expansion of advanced technology of all types in technological universities and departments of sciences and business created favorable conditions for those institutions to compete in fast-changing community. It is no secret that although today's education students have more access to computers than did their counterparts five years ago, colleges and university departments of education are often behind the rest of the campus in available hardware and faculty expertise. The education institutions have seldom received large equipment donations from federal or local budgets that other institutions have. They can hardly purchase the equipment by their own, as the business departments do, since they have no fee-paying students and as a result of it no financial support from this source. Besides, education faculties have usually not received systematic training in technology use. All these factors suggest that trying to infuse technology into teacher preparation curriculum remains a difficult task.

Another problem is connected with availability of computers in elementary and secondary schools. Although computers in Russian schools are widely distributed and access to them by students has increased, the vast majority of schools still do not have enough of them to make the computer a central element of instruction. Lack of funds continues to be a serious problem, identifying one of the powerful obstacles to increase use of technology in teaching. In fact, Russian public schools experience full computer laboratories and classrooms with no computers. Use of email is also not realistic choice for many students yet.

On the other hand, computer use in most of the schools is limited to a Computer Science course , the main purpose of which is to provide learners with computer skills for general purposes, and for business and vocational training. The teachers in traditional subjects hardly use computers in their instruction. The most popular technology tools used by teachers in the classrooms are videocassette-recorder (VCR), an overhead projector, a slide projector. Such single use of technology doesn't allow to exploit the enormous potential which it offers. Teachers need a hand to understand this for helping students solve problems, think for themselves and collaborate with each other.

In this sense an increase in the amount and capability of technology in schools will be required once the technology fully realizes its potential. The level of support from regional authorities might be also enhanced by emphasizing and demonstrating the cost-effectiveness of educational technology, applied to all disciplines.

Even so, availability of technology cannot alone solve the problem. According to E. Willis (1997), "Change from the static perspective of knowledge to that of dynamic...cannot come from the technology itself... Change must come from educators . . . "(E. Willis 1997). Since computers though powerful are not self-implementing, it is the teacher, who plays the crucial role in the educational technology classroom implementation.

However, the vast majority of Russian teachers have had little or no training at all on how apply technology in teaching. In spite of traditional for educators desire to develop professionally and do their job better, they feel left behind the time, since they are not adequately prepared to integrate technology into their teaching. For this to happen they need special training, which could cover both: technology training (learning how to use computers) and technology education (learning about computer and its capabilities). The focus should be placed on both pre-service training and in-service professional development. Unless teachers receive fair training and support, investments in technology cannot be fully effective.

Pre-Service Technology Education

A Brief History

In the Soviet teacher preparation curricula educational technology used to be represented by a course on Technical Aids of Teaching (TSO), comprising one semester either in the first or in the second year of study. The 38 hours of instruction combined both lectures about technology tools and practical training on their use. The subjects of study were the then technologies for classroom use, such as the movie projector, the old type overhead projector, the slide projector, etc.

By now, since most of these artefacts have been out of use, the course became outdated and has been extracted from the curriculum. For some time, it had not been replaced with any other course in educational technology. Recently colleges of education have incorporated a basic computer literacy course into their curricula. Normally, such a course offers 9 hours of lectures and 36 hours of hands-on computer training. Nevertheless, despite the course offerings graduates of teacher training departments do not feel prepared to use computers in their teaching. Since the training is provided by computer science departments or computer centers, the instructors focus on technology issues rather than its applications in education. But teacher training in technology must go beyond learning about formatting disks. It should be authentic and functional.

What Has to Be Done.

There has been considerate research conducted on instructing pre-service teachers how to use technology in classrooms. Many students currently entering the universities have at least minimal experience with the computer. So scholars agree that today's major issues are related to instructional strategies, instructionally appropriate software (J.Willis 1993) and advanced technological pedagogy. Oliver (1994) found that students express a strong need for computer education as an integral part of teacher training, particularly for courses including issues of curriculum and strategies for classroom implementation. Other studies reveal that providing a comfortable learning environment, promoting students participation and supporting them in constructing their own learning enhance their future use of computer technology. Activities facilitated by computer use supply the prospective teachers with the expertise how to enhance creative learning and collaboration in the classroom. With computers students can work on problems individually or in small groups, sharing more responsibility for their own learning. They find that technology is no longer a teaching device, but a learning tool which they can interact. They get convinced that computer skills are very important for successful participation in the educational environment. Furthermore, interaction of the medium requires a shift in the teacher's role from an information presenter to a facilitator of student learning. These need a lot of demonstration and modeling. Unfortunately, undergraduate instruction in most of Russian education schools lacks exemplary teaching models. There is an urgent demand for concrete examples of what technology integration looks like to prepare future educators to teach with technology. The most effective way to get these examples is through *teacher educator* modeling. In fact, use of computers in teaching requires knowledge of computers as well as that pedagogy to support their use. That is why instructors in computer integration courses need to be experts at teaching with technology. They need to show their trainees how to change their teaching style to incorporate technology, or to demonstrate how technology can meet their pedagogical approaches. Ideally, methods instructors in all core subject areas should introduce computer related activities into existing education courses. This would give pre-service teachers continuous training during the entire course of study.

Another way to model educational technology is through *internship* or student teaching practice. Here a teacher intern can see technology promise and problems in real settings. That provide collaboration between new and experienced teachers. The teacher who uses technology creatively and regularly could become a good model for a beginning teacher. Conversely, a student teacher can help bring technology to the experienced classroom teacher, who has not worked with computers previously (Power On! 1989).

Thus, training pre-service teachers in how to integrate technology in their teaching is not successful unless three prerequisites are met: computer literacy applications and computer programming, as an option; faculty to model using technology in the course; and field experience with supervising teachers using learning technologies in their classrooms (Wetzel 1993).

Teacher Educators As Change Agents.

Since pre-service teachers' education is focused on learning how to use technology as a teaching tool, it is teacher educators who must be prepared to address that issue. The instructors from computer science departments, currently conducting the courses, tend to use highly technical language in their teaching and focus on sophisticated technological issues. They fail to provide knowledge how to use technology in teaching, due to the lack of expertise in pedagogy and subject matter. In this way teacher educators can become change agents and build bridges between teachers and technology. Since communication is the essence of their job, teacher educators can bridge communication gaps between the highly specialized language of the instruction and that of the learners. However, there are many teacher educators who lack the skills to model technology uses in their classrooms. The lack of effective training for teacher educators has been a barrier to technology utilization. Therefore, change in technology use must begin with teacher educators.

The research on the use of technology by education faculty comes to the same conclusions as that regarding in-service teachers. Barriers to greater use of technology by both counterparts include lack of equipment, inadequate training, anxiety about technology, and time constraints. To eliminate these barriers faculty and teachers need appropriate preparation, support for experimentation and innovation, and time for learning and practice. The latter is perhaps most valuable of all.

Very often, though proficient in their area of study, faculty feel uncomfortable with technology use. Initial fears about technology need to be overcome by revealing the myth that only "technical people" with large technology expertise can get good results. To achieve this, educators need opportunities to practice with the computer, as well as constant support from instructors, administrators and technology advanced colleagues. Those able to use technology on personal level show best results in implementing it in their teaching. Teaming up with the instructor on identifying topics in the subject matter and then using technology as a teaching aid helps make faculty' experiences more contextualized and meaningful. An innovative approach described in recent studies (Thompson et al. 1996; Gonzales 1999) is a way to accomplish this. It is based on reciprocal mentoring where students mentor faculty on how to integrate technology into their courses and the faculty mentor students on the academic process and teaching itself. Teacher educators empowered as change agents can greatly contribute to the adoption of technology innovations at all levels. For this to occur they should be prepared to invest considerable time and efforts , while university departments should provide support and commitment.

In-Service Technology Education

In-service education plays an important role in technology training. While pre-service education is important in giving future teachers facility with the computer, it only serves as an introduction into the field. Teachers need continuous training, as the technology changes and its applications vary widely, and as more is learned about learning with technology. The advanced training, based on teachers' specific classroom experience and needs can then be provided through in-service and continuing education.

The effective in-service training programs require: first, the system of an ongoing professional growth continued throughout a teacher's career. School administration in Russia has traditionally encouraged teachers to gain new skills and qualifications by providing higher pay for advanced category. In today's transition period, Russian teachers need even more encouragement. The environment of support for experimentation and innovation has to be formed in schools. Second, training workshops for teachers should address specific goals and be based on previous experience and knowledge. As a number of studies report, teachers prefer learning about technology from those who understand the settings in which they work. They appreciate and learn from good modeling on the part of the trainers. Third, appropriate balance between lecturing, discussion and hands-on practice during training should be observed. "Doing" an activity or seeing a teaching strategy modeled does not insure understanding of its possibilities" (E. Willis 1997). Fourth, follow-up support and guidance can make a significant impact of training. Teachers would get back together, report on their use of technology applications, and share experiences and ideals.

The use of technology makes teaching more challenging. Very few teachers have adequate time for planning and preparing for using technology in their classes. They need attending conferences and professional meetings after formal courses taken. Isolation is one of the basic problems teachers face. Workshops provided by professional development institutions are scarce and do not meet the needs of all prospective clients. One of the possible solutions might be long distance learning. Among a large number of Russian higher education institutions, only a few provide long distance education programs, and they do not specialize in educational technology. However, they might be a future investment to provide Russian teachers with opportunities they deserve.

Conclusion

As the 21st century approaches, the demands that society makes on teachers have increased. Trying to respond to these, the Russian teacher education system is being modified and restructured. In addressing these drastic changes, technology training is not the only solution, but it can be one piece of it . The teacher education reform provides the opportunity to consider new roles for teachers and ways for technology to fit in.

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The experience of a teacher educator on the use of IT in primary classrooms

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Abstract: This paper shares the personal experience of a teacher educator in Hong Kong who took the opportunity of lecturer attachment to a local primary school to field-test the application of information technology (IT) in teaching a primary school subject in Hong Kong. This is with the aim to get herself familiar with the application of IT in teaching primary pupils, as well as to initiate more discussion and demonstration in promoting the use of IT to the pre-service teachers. The paper also reports on how the teacher educator planned, implemented and evaluated her teaching, along with the difficulties encountered. The paper concludes with practical suggestions for teacher educators and pre-service teachers in Hong Kong on how to implement IT effectively in primary classrooms.

Background

Computer technology is employed as a tool that supports and extends student's understanding of the pertinent concepts, processes, and themes involved. (Moersch, 1995). In his maiden Policy Address in 1997, the Chief Executive of the Hong Kong Special Administrative Region pledged a five-year strategy to promote the use of information technology (IT) in enhancing the effectiveness of teaching and learning. However, schools in Hong Kong at present vary considerably in terms of their awareness of the need for the paradigm shift, willingness and ability of teachers to teach through use of IT, availability of IT facilities, or even the feasibility of school sites to install computers, and the exposure of their students to IT (Education and Manpower Bureau (EMB), 1998). On the whole, there is a lack of strong IT culture in the school campuses, especially in primary schools. Though it is stipulated in the Five-year Strategy (EMB, 1998) that 60% of the primary schools have each been given 15 computers in 1998, many schools put all these 15 computers in special rooms

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shared by about 20 classes of pupils. Such arrangement does not facilitate pupils' access to the computers.

Teacher Enablement of IT Use

It is also pledged in the Five-year Strategy to provide various training courses to meet the varying needs of teachers. It is also suggested that in addition to the training provided to serving teachers, pre-service teacher education should take the responsibility to equip the future teaching force with necessary knowledge, skills and attitude.

With the high degree of IT application in the tertiary curriculum, it is believed that pre-service teachers are at least IT literate when they graduate from the teacher education institute. However, it is found that the issue of using IT to enhance the effectiveness of teaching has not yet been fully addressed in the current teacher education programs (EMB, 1998). There is a similar situation in other parts of the world, many of today's pre-service and in-service school teachers are not adequately prepared to utilize computing, communications, and other technologies to support teacher-facilitated technology-based learning experiences for school students (Handler, Andris, Moran, Bievenue, Waugh, Payne, Levin & Brehm, 1998). It is recommended in the Five –year strategy that "active steps to assist teachers transit to the new mode of teaching" (EMB, 1998). Emphasis should be placed on how the contemporary mode of teaching can diversify to include elements of IT.

It is common that educators are often asked to develop computer-assisted-instruction (CAI) programs out of whole cloth, using secondhand descriptions or sketches developed by universities or consulting firms that have not tested the innovations themselves (Kohl, 1996). To effect the paradigm shift mentioned in the previous paragraphs, teacher educators should take a more active role to demonstrate the effectiveness of teaching using IT, on the one hand, by fully utilizing IT in their lectures, and on the other hand, by trying to expand the pre-service teachers' knowledge on the application of IT in classroom settings. Moreover, the importance of models of good practice in IT should not be underestimated. It is hard to create new CAI programs if one has not observed relevant examples in action. This is what might be called the paradox of large-scale innovation. Without models, people are left anxious and directionless, innovation fades, and things remain unchanged (Kohl, 1996). Teacher educators' experience in applying IT in primary teaching provides a very good model for pre-service student teachers.

Methodology

This paper describes my experience as a teacher educator who took part in a lecturer attachment scheme and was allocated to teach in a local primary school. During the attachment period, I conducted a small action learning project. My study aimed to field-test the use of technology in the teaching of a primary school subject, in order to initiates a more convincing discussion and demonstration in promoting the application of IT to pre-service teachers.

In this initiative, there is collaboration between academic staff and supporting staff, including staff from the Instructional Development and Media Production Section of the Centre of Learning, Teaching and Supervision in the Teacher Education Institute, who helped produce a series of CAI programs. A total of thirteen programs in two topics were developed. Six weeks of eight lessons of teaching are videoed and analyzed. I studied the eight videoed lessons to reflect on the interaction between the pupils and me, and activities conducted in the lessons. The analysis of the present study was based on three data sources: my reflections during the preparation of the computer-assisted teaching program, as well as obstacles and difficulties encountered; and journals of my own teaching with the use of IT during the attachment period.

Findings and Discussions

The level taught was primary four and the topics covered were:

1. *The Earth* which included the topics of "The shape and structure of the earth", and "Continents and oceans",
2. *The Geographical Setting and History of Hong Kong* which included the topics "The geographical position of Hong Kong", "The relief of Hong Kong", and "History of Hong Kong".

Since most of these topics were factual information, the teaching could be very dry. It was a great challenge for me to design meaningful teaching to arouse pupils' interest to learn. The analysis reported below was organized into three major parts and was supported with data (from the transcription of lessons, reflective journals).

Preparing for the Lesson that Incorporate the Use of IT

Designing Computer-Assisted Instruction (CAI) Programs

In preparing for the lessons that teaching was supported by CAI program, a detailed lesson planning was the most important point to start with. The followings were some reflections of my journals during lesson planning:

> "An extra column "Instructions and resources required for the CAI programs" was included in the lesson plan to illustrate my ideas to design the program. This column recorded the ideas together with a list of information and resources provided for Jacky to design the CAI programs."

Would the education technology officer be able to read my mind by reading a few lines of descriptions? The written instruction in the extra column did not seem to provide sufficient information for the education technology officer. Face-to-face discussions were then conducted so that I could explain my ideas more explicitly, how I came up with the ideas, and the expected effect of the program. However, I was inexperienced in writing the CAI program, some of my ideas were not practical and feasible. The technological ideas provided by the education technology officer were useful for me to modify my ideas of teaching and for my planning.

> "The lesson plan was forwarded to Jacky for action, I hope he could translate what I had written into electronic form".

> "Jacky phoned me this morning and asked me to explain in detail to him what I had written in the column, ... His suggestions to put into practice of my ideas was wonderful that I had ever thought of."

Not many Hong Kong schools have started using IT in teaching, the school that I was attached to was no exception. There was a lack of facilities and internet service in the school. The information and photos I got from the world wide web to support teaching had to be put in the CAI program.

> "I phoned Jacky this morning and told him that I found some useful information and photos about earthquakes on the www, he told me to download the photos if possible, well, this is my first time to download photos from the web!...."

During the trial stage of the program, I found that the headings and descriptions always came before the pictures/diagrams or videos, and all the labels of a diagram appeared together at one time. Though this was common in most other CAI programs, I found that such design did not match with the constructivist view of teaching.

> "....it seemed logical to have the headings before displaying the information and photos, BUT this was NOT my way of teaching, what I believed, the constructivistic view of teaching was that pupils should be involved in exploring, observing or studying some phenomena before they are introduced the concepts.....Fortunately, Jacky understood my philosophy of teaching,...."

A thorough discussion during the trail use of the program allowed both the education technology officer and me to have a better understanding of each other's expectations. And it seemed that the design of CAI program by the technical staff alone would probably be a little more than a computerized presentation. In order to have the CAI well articulated with a learner-centred teaching, the involvement of teachers who could provide a clear message of their conception of teaching in the design process was desirable.

Creating Conditions for Using IT in an Ordinary Primary Classroom

In using CAI program in the classroom, several facilities were indispensable: a computer, a projector and a screen. The following showed the resource constraints and difficulties I faced in transporting the equipment to and setting it in the classroom.

> "Mary, the school head, asked me whether I needed a bigger room for my teaching using IT, if I wanted, she could swap the classrooms by having P.4A moved to P.5B classroom, which was a bigger classroom. In fact, I was very grateful for Mary's arrangement but I preferred to field test the use of IT without causing too much trouble to the pupils and school."

> "How clever I was to use a trolley that had all equipment fixed onto it so that I could carry the equipment with ease to the classroom. ....There were only 35 minutes each lesson, including setting up the equipment and teaching...."

An examination of the facilities available in the classroom and a trial of the setting-up of the equipment were the essential step towards a successful implementation. The followings were my feelings about my first visit to the classroom.

> "How dense the class of pupils was! Fortunately, there was a screen hanging in front of the blackboard. .... There was only about a foot of gap between rows of seat, three feet between the screen and the first row of seats,.... we needed to move the third and fourth rows of seats further apart so that the trolley of projector could move a little bit further away from the screen to make a bigger projection image on the screen."

> "Kin, the supporting staff from the Education Technology Unit, took only a minute to have all items set up on the teacher's bench, but no matter how hard I tried, it took me at least five minutes to complete the task."

Enhancing the Quality of Teaching and Learning

Improving Teaching and Learning with the Incorporation and Assistance of IT Elements

It seems that the use of IT can help to transform the way in which education is delivered in primary classrooms by breaking down the traditional boundaries of teaching and learning, from a largely textbook-based teacher-centred approach to more interactive and learner-centred approach.

> "The program was so powerful that it illustrated very clearly the seven plates on the earth surface. When a pupil moved the cursor around the earth surface, he could identify the different plates by himself." (Lesson 2)

> "The interactive activity for pupils to place each of the historical sites to its exact location served not only help pupils to identify the locations, it also helped pupils to revise previous knowledge of the different districts in Hong Kong" (Lesson 10 and 11)

The use of IT also helped to link up pupils with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global view.

> "Pupils were able to observe the change and extension of Hong Kong's coast line by clicking the button, that is fantastic for pupils to make a comparison between the present and the past. The magnifying effect of the scene of the harbour showing how ships entered Hong Kong surprised pupils" (Lesson 8)

> "The videos of the different historical sites in Hong Kong provided an eye-opening experience for pupils, like touring around Hong Kong electronically." (Lesson 10)

> "It took me a lot of time to search for photos and pictures about old Hong Kong from about twenty books in the library (some of them were for reference that I could not take them out) and websites. Surprisingly when all these were put together in the program, it presents a very interesting and attractive story of the development of Hong Kong." (Lesson 12 and 13)

Moreover, there was evidence that IT had the potential to liven up classroom life by making teaching and learning more dynamic, interactive and innovative where pupils could become more motivated and inquisitive, to bringing about more effective teaching and learning.

> "The effect produced by the computer assisted teaching was wonderful, when I wanted to talk about "ASIA", I just needed to move the cursor to the exact place and it automatically flashed, this was very useful to focus pupils' attention" (Lesson 4)

> "The animation of a plane flying from Hong Kong to San Francisco aroused pupils' interest to solve the problem of time lag". (Lesson 5)

> "The interactive activities designed in the program provided a very good opportunity for pupils to use the computer, all of them were actively involved in making guesses to the answers.....How strange it was! About half in this class have never touched the computer before this lesson, ... I felt the girl's hand was shaking when I taught her how to use the mouse to select her answer." (Lesson 8).

Incorporating with Other Teaching/Learning Activities

There has been government target of having 25% of the school curriculum taught with the support of IT (EMB, 1998). To achieve this 25% target, it is necessary to bring about changes to the current school curriculum and the existing mode of teaching and learning. This can proceed gradually by first enhancing the level of awareness and meaningful use of IT in the existing curriculum with incorporation and assistance of IT to liven up some other learning activities. In other words, this is reconstructing teaching and learning with IT rather than replacement of the existing mode of teaching and learning with IT elements.

> "Though the use of the computer program is effective, some demonstration with teaching aids (foam plate and water) to illustrate the floating of plate on the larva is very helpful for pupils to experience it." (Lesson 2)

> "The programme gave an introduction to pupils on how earthquakes happened and showed pupils the damages caused by disastrous earthquakes. The group activities are very useful to help pupils to identify the seriousness of earthquakes which are of different scales and to identify places that usually have earthquakes are situated at the edges of plates." (Lesson 3)

> "Though I did not use computer program in this lesson, the use of scanner and colour printer in re-producing the maps for the activities, to me, was also a very effective use of IT." (Lesson 6)

> "Besides having a happy time with observing the videos of different historical sites, the activities requiring pupils to identify the history of the sites helped pupils to have better understanding of the history behind." (Lesson 10 and 11)

Conclusion

This paper aims at evaluating neither the effectiveness of the teaching and learning process nor the student learning outcome. It is noted by Dwyer, Ringsraff and Sandholtz (1992) that "The use of technology does not guarantee fundamental change in teaching-learning process and consequently in learning outcomes". It is hoped that the analysis provides a better understanding of the process of planning and implementation process, as well as the issues and concerns in teaching with the use of IT in Hong Kong primary schools.

Moersch (1995) found in the current use of technology that most of them are used for isolated activities unrelated to a central instructional theme, concept or topic. My experience in the present study also suggested that the incorporation and assistance of IT elements and other activities could make teaching and learning more meaningful. Such experience concurred Cuban's (1997) saying that 'the overall goal was to create different forms of learning and teaching with the help of technology, not have technology determine what was to be learned or how it was to be taught' (p.xiii). Hence IT should be incorporated into and complement the conventional instruction. Though the level of technology implementation demonstrated in the present study is only at level 4A - Integration (mechanical) among the six levels suggested by Moersch's Level of technology implementation framework. My experiences addresses the resource constraints in using IT in schools, it also provides insights to the teething problems in building up an IT culture in schools.

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Gender-Related Differences In Computer Anxiety Among Technological College Students In Taiwan

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Abstract

This study investigates gender-related differences in computer anxiety and the variables related to male and female students' computer anxiety. Participants were 549 college of technology students, each was administered a revised Computer Attitude Scale. MANOVA results indicate that male students had significantly greater confidence and lower anxiety than female student. Male students' computer anxiety was influenced by their own locus of control and total number of computer courses taken. Female students' computer anxiety was influenced by the same two variables as well as by their subject majors. Age and grade level, however, showed no significant influence on these students' computer anxiety. Standard deviations were relatively large, suggesting there was a great variance among students responses.

Gender as a differentiating variable in college students' computer use has been examined in a number of studies during the past two decades. Most of these studies are centered on students in colleges of liberal arts or teacher colleges. For example, Busch (1995) examined college students and documented gender differences in perceived self-efficacy regarding completion of complex tasks in both word processing and spreadsheet software, but not in simple tasks. Harris & Grandgenett (1996) found that gender is an attributing variable to teachers' anxiety in their use of networked resources. Very few research studies, however, have been specifically focused on students in technological colleges, assuming that these students receive adequate training in computer and technology, and are therefore least fear of using computer. It is important to understand the actual perceptions and needs of technological students and some influencing variables like gender on their computer use. Unrealistic assumptions may interfere the provision of educational programs that address their unique needs. Therefore, the purpose of this study is to investigate gender-related differences in computer anxiety, and to determine the variables related to male and female technological students' computers use.

Methods

The participants of this study were 549 college of technology students. Among them, 100 were male and 449 were female. These students majored in eight subject areas. About 96% of them were age 25 or younger. About 86% of them had computers at home and over 60% of them had been working with computers for more than two years. Nearly 60% of them had taken two or more computer-related courses.

The instrument used in this study is the revised Teacher Computer Attitude Scale (Violato, Marini, & Hunter, 1989). It includes 10 items measuring computer anxiety and confidence on a 5-point Likert type scale. A score of 1 indicates that a student disagrees strongly to the statement and a score of 5 indicates that a student agrees strongly to the statement. The instrument has been found to be reliable and valid in previous studies (Huang, 1997; Huang & Padron, 1995; Liu, 1998). For the present study, the instrument was translated into Chinese for the use of participants in Taiwan. Content validity was verified by reversing the translation of Chinese survey into English by English teachers who had not seen the original English version. No revision was found necessary. The alpha reliability coefficient is adequate at .87. A few questions on students' demographic and computer background were also included in the survey.

The instrument was administered to students in mid of the academic year by experienced researchers. Students answered the questionnaire anonymously. Multivariate analysis of variance

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(MANOVA) was used to determine whether if there were significant differences in computer anxiety by gender. Follow-up univariate analysis of variance (ANOVA) was performed to determine where the differences were. A series of multiple regression was used to determine the variables related to male and female students' computer anxiety.

Results

The results indicate that college of technology students generally had above average confidence and below average anxiety in using computers. The item with the lowest score is "Computers make me feel uncomfortable," followed by "I get a sink feeling when I think of trying to use a computer". The item with the highest score is "I am able to do as well working with computers as most of my fellow university students".

MANOVA results indicate an overall significant difference in computer anxiety by gender (F(10, 538) = 2.71, $p < .01$). Male students had greater confidence and lower anxiety in using computers than female students. Table 1 presents the ANOVA results. Significant differences between male and female students were found in the following items: (a) I feel confident with my ability to learn about computers ($p < .05$); (b) Working with a computer would make me very nervous ($p < .05$); (c) I am not the type to do well with computers ($p < .05$); (d) I feel comfortable using computers ($p < .01$); and (e) Computers make me feel uneasy and confused ($p < .01$).

Table 1
Differences in computer anxiety between male and female technological college students

Indicator	Male		Female		ANOVA
	M	SD	M	SD	F
I fell confident with my ability to learn about computers	3.57	0.96	3.32	0.95	5.56*
Working with a computer would make me nervous	1.40	0.97	1.64	1.01	4.76
I get a sinking feeling when I think of trying to use computer	1.30	102	1.34	0.93	0.15
Computers make me feel stupid	1.42	1.13	1.41	0.99	0.02
Computers make me feel uncomfortable	1.24	1.06	1.33	0.89	0.78
I am not the type to do well in computers	1.66	1.05	1.94	0.98	6.63*
I feel comfortable using computers	3.58	0.90	3.26	0.79	12.84***
Computers make me feel uneasy and confused	1.46	1.17	1.79	1.13	6.76**
I think using computers would be difficult for me	1.39	0.94	1.42	0.80	0.42
I am unable to do as well working with computers as most of my fellow college students	1.36	0.94	1.42	0.80	0.42

* $p < .05$ ** $p < .01$ *** $p < .001$.

Multiple regression results reveal that students' locus of control of computer use, age, grade, year(s) of computer experience, computer(s) at home, subject majors, and number of computer courses taken have an overall significant effect on male (F = 9.83, $p < .001$) and female (F = 30.86, $p < .001$) students' computer anxiety. The R square value for male students equals to .43, suggesting that 43% of the variance in male students' computer anxiety may be explained by the seven independent variables. The R square value for female students equals to .33, suggesting that 33% of the variance in female students' computer anxiety may be explained by the seven independent variables. Stepwise regression results show that locus of control and total number of computer courses taken have significant effects on male students' computer anxiety. On the other hand, students' locus of control of computer use, subject major, and total number of computer courses taken have significant effects on female students' computer anxiety.. Table 2 displays the regression results by gender.

Table 2
Multiple regression results of variables related to male and female students' computer anxiety.

Variables	Female		Male	
	Beta	p	Beta	p

Locus of control	.50	.0001	.58	.0001
Subject major	-.13	.0028	-.08	.4071
Age	.00	.9337	-.04	.6730
Grade	.02	.7176	.02	.8619
Length of computer use	.05	.2316	.07	.4361
Computers at home	.01	.7848	.08	.3368
Total number of computer courses	.18	.0001	.19	.0001

Discussion

The findings of this study indicate that there were significant differences in technological college students' computer anxiety by gender. Male students were more comfortable and had lower anxiety using computers than their female classmates. These findings support previous research on the impact of gender-related perceptions on computer anxiety among college and university students (Brosnan, 1998; Liao, 1999). Plausible explanations include that (1) female students majored in different subject areas than male students; (2) female students had taken fewer computer courses, and (3) social stereotype of computer proficiency. Computer and technology have been portrayed in the society as more appropriate for male than for female and thus influence male and female students' self-efficacy in using computers. Because freedom from anxiety has been found to be an attributing variable to computer achievement (Liu & Johnson, 1998), it is important to reduce computer anxiety among female students. This can be done by identifying the areas and sources of anxiety in computer use by female students, and design instructional technique that can reduce their computer anxiety (Ayersman, 1996; Ayersman & Reed 1995-86; Liu & Johnson, 1998; Presno, 1998). For example, Fitzgerald, Hardin, and Hollingsend (1997) developed a course in hypermedia authoring program and provided instructional strategies to help decrease participating education students' computer anxiety.

Findings of the present study have provided a better understanding of gender-related technological college students' computer anxiety, identifying several related variables, such as locus of control and courses taken. Future research need to examine how these and other variables may be used to enhance equity among technological students' computer confidence and achievement.

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The In-Service Training Programs for Primary School Teachers to Use Information Technology in Australia and in Taiwan

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Abstract: This paper describes the in-service training programs for primary school teachers to use information technology in Australia and in Taiwan. The advantages and disadvantages of the training programs in these two countries are analyzed and compared. The Taiwanese government has done an excellent job in setting up the Internet infrastructure and different levels of technical support, and its in-service training programs have good supports for the full-scale implementation of web learning in the primary schools. However, the Australian in-service training program has merit in the setup of the full time facilitators and a good record tracking system to reduce the cost. Thus, a combined approach to take advantage of the best parts of these two in-service training programs is recommended in the future. This approach will help primary school teachers to learn and to adapt information technology in the classrooms more quickly.

Introduction

The advance of network, multimedia, communication technology has made a great impact on the way people work and learn. Today, information technology enables teachers to outreach teaching resources on the Internet, communicate with subject domain experts or other school teachers through the World Wide Web (WWW).

In Australia, the Department of Education and Training (DET) in the New South Wales (NSW) has funded public primary schools to purchase at least one modem and some Internet computers under the Computers in School Policy. Moreover, DET began a statewide Technology in Learning and Teaching (TILT) program in 1996 to promote computer and network literacy of primary school teachers (Training and Development Directorate, 1997).

Similarly, the Department of Education (DOE) in Taiwan identified the importance of information technology in education. In the past ten years, money and efforts have been allocated to set up the network infrastructure, computer laboratories and technical support centers in all levels of government schools. Moreover, from 1 October 1998 to 30 June 1999, the Taiwanese Government has spent a total amount NT$647 million (approximately US$20.2 million) dollars to update computer hardware, networking hardware and software in all levels of schools with a special focus on high schools and primary schools. Also, in-service training courses and local network support centers were provided to build up the computer literacy of the primary school teachers (Department of Education in Taiwan, 1999a).

In-Service Teacher Training Programs in Australia

Starting from 1996, DET in NSW had funded many state universities to run a 2-hours Internet workshop for primary school teachers. Each school in NSW selected one teacher as the Internet Contact Person (ICP) to attend the workshop. Moreover, later in 1996, the DET conducted a statewide TILT program. Approximately 150 teachers in NSW were selected as facilitators, and they were trained so as to be able to train other teachers. The facilitators were paid by their schools, but DET allocated extra money for schools to hire substitute teachers, so facilitators could be released from teaching and administrative tasks. Their major task was to train 70 teachers in the school districts each semester every half year. Each semester, the facilitators ran a thirty-hour workshop which contained six components entitled "Powerful tools to enhance teaching and learning", "Beyond the classroom walls", "Computers and related technologies", "Software", "How can I do this in my classroom", and "Future Directions". Each component lasts for five hours. There is a one-hour video program addressing the key issues, a two-hour hands-on activity using computers and related technology, and a two-hour follow-up activity related to the practical application of skills in the classroom (Training and Development Directorate, 1997).

Roughly one-third (15,000) of the primary school teachers in NSW have participated in the TILT program from 1996 to June 1999. The participants attended the workshops of the TILT program every two or three week after school. During the training period, DET allocated funding to each school to release the participants from the normal teaching loads for three single days or six half-days. They can use the free time to practice what they had learnt or ask the facilitator to do one-to-one tutoring. Moreover, the participating teachers are not allowed to take the same TILT program repeatedly in the future (Training and Development Directorate, 1997). The goal of the TILT program is to train 10,000 more teachers (i.e. up to 55% of the primary school teachers in NSW) to participate in the TILT program by Year 2000.

In 1999, DET in NSW also ran a small-scale survey to trace the participating teachers who attended the workshop in 1996-1998 period. The survey showed that 80% of the participants applied the computer technology in the teaching and administrative work at least once a month. Among which, about 63% of the participants used a computer at least once a week (Training and Development Directorate, 1997). However, there was no real application of network technology in classroom teaching and learning activities currently due to the limited numbers of modems to access the Internet.

In-Service Teacher Training Programs in Taiwan

Before 1995, governmental organizations, universities and colleges conducted in-service teacher training programs regarding information technologies. It was very costly for primary school teachers to participate in the training courses because schools have to pay for the substitute teachers and pay the travel and registration fees for the participants. Usually, the training courses were held for half-day or one-day. Occasionally, there were some workshops that lasted for three to five days. Yet, these short-term training courses did not have a good outcome because when the participating teachers returned to their schools, they sometimes did not have the equivalent computer hardware or software to practice what they have learnt in the workshop. As a result, they usually forgot the training content quickly and could not apply what they learned in their classrooms immediately.

As far as the training of facilitators is concerned, there were a few training programs that lasted for three-months or half-year to train some selected teachers to be facilitators. However, the facilitators' teaching loads are usually not waived. Meanwhile, they were also responsible for the maintenance of computer laboratories because primary schools in Taiwan did not have the budget to pay computer companies to maintain the computers, and there are no computer technicians in schools. As a result, the workloads of the facilitators are very heavy, and there are many complaints about it (Roy, 1999).

Before 1997, not many primary school teachers in Taiwan had been trained to use information technology. The reason for the lower outcome is due to the lack of record tracking of the trained teachers. Usually, those who were interested in learning computer technology would take the opportunity to attend different teacher-training courses over and over again.

To improve the shortcoming of the traditional teacher-training model, a new "on-site, full-scale" model had been applied to train all the primary school teachers in their schools from 1 Oct 1998 to June 30 1999. The DOE in Taiwan also selected some schools in each county to be the technical support centers as well as teaching resource distribution center. The DOE in Taiwan allocated funds to conduct the teacher-training courses with an aim to train 70% of teachers in each primary school (Department of Education in Taiwan, 1999b). There are also selected universities that are network centers of Taiwan Academic Network (TANET) which provide higher level technical supports to the county level technical centers, and they may even provide direct supports to primary schools if needed.

Starting from 1 Oct. 1998, many workshops were run for a semester to enhance the learning outcomes of primary school teachers. Every Wednesday afternoon, there were no classes for all the primary school teachers in Taiwan. The experienced facilitators or university professors came to primary schools and gave a four-hour training course to teach a wide range of preliminary computer and network knowledge and skills.

There were nine units of the basic courses including Windows 95, CAI, Internet application, MS Word, The application of WWW in teaching, Network Multimedia, CD ROM, Computer Maintenance, PowerPoint. Each unit was either four-hours or eight-hours depends on the difficulty of the content or the participants' background knowledge and skills. Some schools provided advanced training courses on Saturday every two weeks. The advanced courses included Homepage Construction (18 hours), Excel (12 hours), MS Outlook (12 hours), Word 97 (12 hours). The new "on-site, full-scale" model of teacher-training programs turned out to be more efficient than the traditional teacher-training courses. (Department of Education in Taiwan, 1999c).

Comparison of the training programs in Australia and in Taiwan

Although the TILT program in NSW, Australia has successfully trained more than 1/3 of the K-12 teachers in three years, the real application of the network technology in the classrooms has not become popular due to the limited numbers of modems, network hardware and software. On the other hand, the Taiwanese DOE has spent more than ten years in training teachers and promoted the usage of email and WWW in primary schools. In the past year, the network and hardware/software have been upgraded significantly. Many centers have been set up in each county to distribute teaching materials, software, CD ROM and other teaching resources developed in the past years. In addition, many WWW web sites have been developed to support the real application of information technology in the practical classroom teaching and learning.

There are some advantages in the Australian in-service teacher-training program. Firstly, Australian facilitators are released from teaching loads, so they can concentrate on running the workshops and provide tutoring to assist the participating teachers. On the other hand, Taiwanese facilitators were very much overloaded by the tasks of training other teachers in their schools and maintaining the computers on top of their ordinary teaching loads. However, starting from 1998, there are remedies. For example, when primary schools purchase hardware from a computer company, it is required that the company takes the responsibility of the hardware maintenance for three years. Moreover, the teaching loads of facilitators are reduced somehow to compensate their time in training other teachers.

Secondly, the Australian in-service training system keeps records on the participants' names and only takes those who have not attended the TILT programs. In contrast, there is no record tracking in the Taiwanese in-service training system. One of the shortcomings is that limited numbers of teachers who are interested information technology may take different training courses repeatedly. However, the Taiwanese government has changed the strategies of in-service teacher training. The newly introduced "on-site, full-scale" training model works quite well to make sure that most teachers in the primary schools have attended the workshops. Yet, it is very costly for the government to do so, and the new model only last for eight months.

Conclusion

The Australian teacher in-service training program is more cost effective. The ways to release facilitators to allow them to concentrate on training, and the record tracking of the participating teachers have proven to be effective and economical. The next step to take is the setting up of the network infrastructure in the primary schools and the organizing of the technical support centers in school districts, so teachers and students will benefit from the progress in information technology.

The Taiwanese teacher in-service training programs have better support in terms of the network infrastructure, the setup of the county's technical support centers to promote web-learning and to distribute teaching resources, and development of many web sites to enhance the teaching and learning through Internet in the Taiwanese primary schools. However, both the traditional model and the new model of teacher training programs in Taiwan are very expensive to execute.

Apparently, Taiwanese in-service training programs have better supports for the full-scale implementation of web learning in the primary schools. However, the Australian in-service training program has merit in the setup of the full time facilitators and good record tracking system to reduce the cost. It is recommend taking a combined approach to take advantage of the best parts of these two in-service training systems to help primary school teachers to learn information technology.

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TEACHERS READINESS IN USING COMPUTERS IN CLASSROOM - A STUDY IN MALAYSIA

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Abstract: This paper is a report on a pilot study to find out whether the teachers in Malaysia are computer literate and to explore teachers' attitudes towards using computers in the classroom. Questionnaires were distributed to schools and statistical analysis was used to present the results. The findings of this study show that the teachers are computer-literate, using computers for various tasks from administrative work such as recording students' grades and typing assignments for students to leisure such as playing games and Internet surfing at home. The teachers agreed that computers can be a useful tool in the process of learning for schoolchildren in Malaysia. They have a positive attitude that the usage of computers in the classroom can be implemented and are willing to learn the ways to use computers in the classroom. However, the teachers are not too agreeable or certain that computers are not indispensable in teaching since it cannot take the role of teachers.

Introduction

Malaysia is a developing country that emphasises on the development of information technology. In the early eighties, computers were introduced to schools through the establishment of computer clubs. From then onwards, it has attracted interest in schoolchildren. The Malaysian government through her sixth Malaysian Plan has decided to introduce computer studies as a subject in all secondary and primary schools. In October 1993, Prime Minister Datuk Seri Dr. Mahathir Mohamed urged more schools to use computers as part of their teaching and learning process. Therefore, in 1994, the Ministry of Education decided to further enhance computers usage in the learning process in the classroom by introducing computer literacy subjects in the curriculum.

Teachers play an important role in the classroom. For the usage of computers in classroom to be a success, teachers must have the knowledge and the willingness to learn to use computers effectively before imposing the usage on the students. In 1994, a research investigating the attitude of teachers towards Computer Aided Instruction (CAI) found that teachers generally have a negative perspective towards computer (Zulkifli, A.M & Raja Maznah R.H.). However, this perspective might have changed due to several reasons. First, is that the Prime Minister's Vision 2020 to make Malaysia a developed country through industrialization using the latest technology. Together with the Vision 2020, is the development of the Multimedia Super Corridor that emphasises the development of information technology. The information technology program also leads to the development of smart schools, where computers are used extensively and intensively in the process of learning.

With all the recent development in Malaysia, another research should be carried out to find out whether currently teachers have a more positive outlook towards computer. This pilot research aims at exploring the readiness of teachers in using computers in classroom to enhance the process of learning. Readiness here can be defined as the teachers having the knowledge to use the computer (computer literate) and as the teachers' willingness to learn and use computers in the classroom. With all the preparation and money allocated by the government to introduce computers and information technology in the classroom, are teachers, as the main figure in the classroom, willing to use computers in their work, or in the classroom as a teaching tool?

Demographic Findings

This pilot study is based on questionnaires that were distributed to 122 teachers from five different secondary schools. Malaysian secondary schoolchildren range from the age of 13 to 18 years old, while teachers must have at least a diploma in education, often with additional bachelor or master degree. The respondents in this study ranged from 23 to 55 years old, with the majority in the 26-35 years old group. Majority were Malay (118), and female (112).

Teaching experience of these teachers ranged from as new as less than a year to teaching more than 20 years. A large numbers (51) taught languages, either Malay or English, while smaller numbers taught Sciences, Mathematics, Religion, History, and Living Skills.

Computer Usage Among Teachers

A huge percentage of the respondents (86.1%) claimed to have experiences using computers, either self-learned, taught by friends, or acquired through courses. Slightly more than half of the respondents (63.9%) have personal computer at home which they used for typing (94.3%), playing games (46.7%), surfing Internet (43.4%), and watching CDs (52.5%).

More than fifty percent of the teachers (66.4%) said that they were directly involved in using computer at school, of which 41.8% used computer for clerical work, 67.2% for preparing exams, quizzes or grades, and only 23.8% for teaching and learning in class. From the 122 respondents, only 5 teachers claimed to use computer in classroom, where as there remaining respondents still use traditional chalk and board method.

In encouraging teachers to utilize the technology in their work, the ministry have allocated computers at schools. Among the five schools surveyed, one school with 118 teachers have 10 computers where 60% of the teachers believed that they have access to only two of the computers. Another school with 90 teachers have 24 computers where many perceived that they could only use from one to about six of the computers. The other three schools have 52, 38 and 48 teachers, each with a total numbers of 20, 14 and 20 computers and majority of the teachers perceiving they have easy access to most of the computers. Table 1 summarizes the utilization of computers in the schools surveyed.

Table 1: School and Computer Utility

School	Total Teachers	Total Computers	Ratio Teachers : Computer
A	118	10	11:1
B	90	24	4:1
C	52	20	3:1
D	48	20	2:1
E	38	14	2:1

Thirteen (13) statements were given to gauge the teachers' willingness to use computers. On a scale from 1 "strongly Agree" to 5 "Strongly Disagree", the results show a positive sign. Table 2 summarizes the findings.

Table 2: Teachers' Willingness To Use Computer

Statements		Mean	SD
1.	I would like to learn more about computers as a teaching tool.	1.36	1.00
2.	I need more information on computers and its applications.	1.39	0.67
3.	With computers, my work will be updated faster.	1.36	0.69
4.	Computer's instructions are easy to follow.	2.40	1.10
5.	I am ready to use computers in my teaching process.	2.85	1.49
6.	I will not spoil the computers when using them.	2.99	2.28
7.	I am not too old to learn.	1.73	1.14
8.	I have the time to use the computer in the classroom.	2.79	1.25
9.	I have the chance to use the computer in my school.	2.25	1.22
10.	I can teach effectively without using the computer.	3.36	1.27
11.	I want to use the computer but I do not know how to operate it.	3.55	1.26
12.	All teachers need to develop some proficiency with computers.	1.80	1.39
13.	A qualified teacher should have mastered the proficiency of computer in order to improve teaching responsibilities and knowledge in computers.	2.02	1.14

A set of fourteen statements that reflect teachers' readiness to use computers as a teaching tool were included in the questionnaire. The respondents show a sign of readiness to use computers in the process of learning. Table 3 summarizes the findings.

Table 3: Teachers' Readiness To Use Computers As a Teaching Tool

	Statements	Mean	SD
1.	I would like to learn more about computers as a teaching tool.	1.36	1.00
2.	With computers, my work will be updated faster.	1.36	0.69
3.	Computers will replace teacher's role in future.	3.03	1.24
4.	Computers are valuable tools in improving the quality of a child's education and creativity.	1.73	0.80
5.	Computers are only useful in Science or Mathematics.	1.95	1.10
6.	Using computer in a classroom is a burden to the teachers.	2.49	1.33
7.	I am ready to use computers in my teaching process.	2.85	1.49
8.	I have the time to use the computer in the classroom.	2.79	1.25
9.	I have the chance to use the computer in my school.	2.25	1.22
10.	I can teach effectively without using the computer.	3.36	1.27
11.	I want to use the computer but I do not know how to operate it.	3.55	1.26
12.	All teachers need to develop some proficiency with computers.	1.80	1.39
13.	A qualified teacher should have mastered the proficiency of computer in order to improve teaching responsibilities and knowledge in computers.	2.02	1.14
14.	Teachers who are beginning to develop their computer skills need a lot of confidence.	1.92	1.06

An analysis of all the statements on the willingness and readiness of using computers among the respondents are given in Table 4. This summarizes the overall attitude of the respondents towards computers.

Table 4: Overall Attitude Towards Computer

	Statements	Mean	SD
1.	I would like to learn more about computers as a teaching tool.	1.36	1.00
2.	Computers need expertise to operate.	1.79	0.94
3.	I need more information on computers and its applications.	1.39	0.67
4.	With computers, my work will be updated faster.	1.36	0.69
5.	Computers will replace teacher's role in future.	3.03	1.24
6.	Computers are valuable tools in improving the quality of a child's education and creativity.	1.73	0.80
7.	Computers are only useful in Science or Mathematics.	1.95	1.10
8.	Using computer in a classroom is a burden to the teachers.	2.49	1.33
9.	Computer's instructions are easy to follow.	2.40	1.10
10.	I am ready to use computers in my teaching process.	2.85	1.49
11.	I will not spoil the computers when using them.	2.99	2.28
12.	I am not too old to learn.	1.73	1.14
13.	I have the time to use the computer in the classroom.	2.79	1.25
14.	I have the chance to use the computer in my school.	2.25	1.22
15.	I can teach effectively without using the computer.	3.36	1.27
16.	I want to use the computer but I do not know how to operate it.	3.55	1.26
17.	All teachers need to develop some proficiency with computers.	1.80	1.39
18.	A qualified teacher should have mastered the proficiency of computer in order to improve teaching responsibilities and knowledge in computers.	2.02	1.14
19.	Teachers who are beginning to develop their computer skills need a lot of confidence.	1.92	1.06

Discussion

This study defines computer literacy as the ability to handle and uses the computers to perform the desired tasks effectively. The findings show that a big percentage of the teachers have experiences using computers. The ability to use computers shows that the teachers are computer literate. The usage of computers is not limited only in their workplace but also at home. Various activities are done through using computers signalling a positive feedback that the teachers are literate enough to manipulate computers to suit their needs. It is very interesting to know that the teachers learn how to use the computers through their own initiatives or through their friends.

Generally the teachers are willing to use and acquire more knowledge on computers but at the same time are quite sceptical about the role of computers in the classroom. Specifically, they don't think in order to teach effectively, they have to use computer. They also feel that they don't have time to use computer in their classroom. This findings should not be viewed negatively since teaching is a two way process which requires natural interaction between two humans, more so with school children.

Overall, the teachers agreed that computers could be a useful, but not practical tool in the process of learning for Malaysian schoolchildren. This is due to the factor that the teachers themselves are already burdened by their teaching preparations and extra curriculum activities. In addition, the current numbers of computers in schools are far from sufficient to cater for schoolchildren in a classroom. Apart from the advantages offered by the computer technology, Malaysia still has to get some basic financial and logistic preparations sort out to ensure that the implementation of computers in classroom a success.

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Advocating Reflective Learning in a Teacher Training Program

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Abstract: This paper evaluates the effectiveness of conducting reflective learning in a teacher-training program, which comprises of TESL (Teaching English as a Second Language) undergraduates studying in Universiti Malaysia Sarawak, through web-based instruction. Findings indicate the perception of the undergraduates, who are taking a CALL (Computer-Assisted Language Learning) course, towards the use of web-based instruction as a medium of instruction, collaboration and reflection.

Introduction

> **Teachers open the door, but you must enter by yourself.**
> Chinese Proverb

To survive in today's world of Information and Communication Technologies (ICT), learners require aptitudes in self-learning and self-discovery through reflective thinking. Failures to independently build knowledge and adhering to passive learning interaction limit further development of cognition. Seeing these fallacies in classrooms of the present day, educators are inclined to find alternative strategies to empower the learners and enhance the learning experience. Using web-based technology is one.

To empower learners, Neilsen (1999) suggests some guiding principles to become independent thinkers, readers, and learners:

1. Allow learners to be actively involved in the learning process.
2. Provide consequential contexts for learning.
3. Provide a supportive learning environment.
4. Provide opportunities for learners to collaborate.

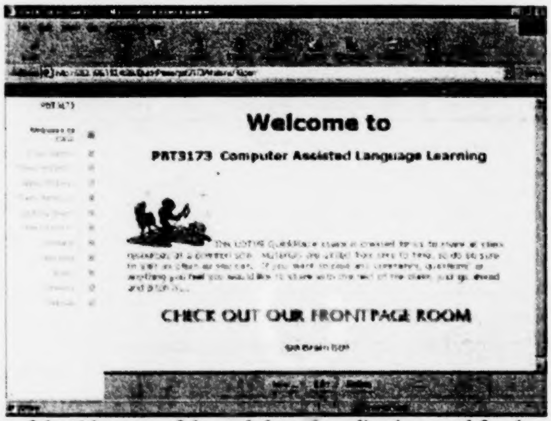
With the fluidity of the web, these components can be easily integrated into the classroom instruction. With the emergence of the web in the educational technology realm, the trend in classrooms heads converging different approaches in the teaching and learning process. Web-based instruction becomes a tool to maximize the effectiveness of each stakeholder in the entire learning environment.

Why reflective learning? According to Dewey (Gordon, 1998: 34), "...reflective learning involves resolving an indeterminate, problematic situation." Thus, reflective learning, which comprehends issues in problem solving revitalize the learner to reflect on knowledge and experience. The transformation of an entirely new insight is gained when knowledge is reconstructed (Hullfish & Smith, 1961: 207). The processes of reflective learning consummate through a "conversational framework" simultaneously consist of discursive, adaptive and interactive process of learning. The "conversational framework" defines a structure of an interactive conversation that relates to the content in conditions of a topic goal (Laurillard, 1993:104).

The application of "conversational framework" instead of assisted through verbal conversational dialogue, was conducted on-line in written form. Learners interactively participate in a written form of discussion, done individually or in groups. The flexibility of asynchronous communication promotes reflective thinking when a larger group of interaction requires the retrieval of previous discussion as well as personal views. The capability of computer-mediated communication, which secures group interaction through a security login procedure, gains learners' confidence and builds on their comfort zone to reflect on ideas and views posted from peers, devoid of temperance of outsiders. In any case, "technology can support and strengthen relationships, but never create or replace them" (Schneiderman et.al.1998).

The Study

A Computer-Assisted Language Learning (CALL) course was conducted for one academic semester (four months) at the Universiti Malaysia Sarawak. The course is one of the core components of a teacher education program (Teaching of English as a Second Language majors) At the initial stages of the course, learners attended face-to-face lecture sessions twice a week (4 hours), complemented with the utilization of a web-based application, made available to all course participants. Course assignments are mostly supervised on-line with asynchronous interaction between the instructor-students and student-student.



Welcome to

PRT3173 Computer Assisted Language Learning

CHECK OUT OUR FRONTPAGE ROOM

Figure 1: A screen shot of the title page of the web-based application used for the course.

The four processes of learning, which are discursive, adaptive, interactive and reflective, integrated in the "conversational framework" (see Figure 3) encourage the participation of learners in this course to freely and interactively share views and ideas related to the subject matter. The model of the "conversational framework" indicated in Figure 1, shows the process of learning experienced by the instructor and students. The instructor manages and guides the on-line discussions, and questions are posted to stimulate reflective thinking. In the beginning, learners given individual assignments are encouraged to share their opinions based on own readings and personal understanding without any guidance from the instructor or peers. However, later, assignments are distributed to different teams formed in the class, and team members are required to brainstorm and share ideas to improve on the task at hand. Initially, learners begin with a team-based interaction that generates ideas and comments with feedback from each team member. Then, each member eventually learn how to think deeper when asked to reflect on the views of others that differs from their own, and when they are asked to utilize the knowledge and perspective to improve on their own understanding. As put by Andrusyszyn and Davie, "the important strategy for the clarification of their own understanding is based on individual reflection on their own values and learning" (1995).

The achievement of individual understanding requires collaboration on theoretical concepts and practical perception on the topic of discussion. "In order to share, learners must first be clear about their own concepts and understanding" (Andrusyszyn & Davie, 1995). It is then that collaboration would succeed in the quest of diffusing vast knowledge and experience beyond the boundaries of traditional text. Teamwork collaboration through web-based instruction interacts in the search for meaning. "Meaning is central in learning and, hence, is central in thinking; it pervades the learning experience" (Hullfish & Smith, 1961). Thus, collaboration supports the process of learning through reflection of discursion, adaptation and interaction.

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Findings

Questionnaires were collected at the end of the course with the return rate of 92.86%. The questionnaire evaluates the perceptions of the participant towards the conduct of an on-line discussion course in relation to the use of reflective learning. There are 8 males and 18 females who participated in the study. The t-test and One-Way ANOVA procedures are applied to determine the significance of selected variables.

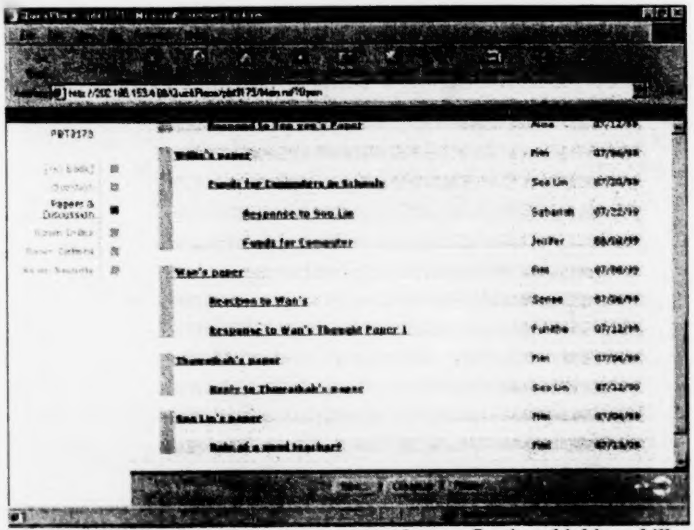

Figure 2: Screen shot of the online discussion room, where reflective thinking skills were put to use throughout the course.

Data from the survey indicated that the group who used the web-based application perceives that it motivates and challenges them in the course development. Most reported that they are able to follow the reflective thinking tasks assigned on the web-based application, and they noted a sense of learner control over the course, as they are able to contribute to the course curriculum through the use of the web-based application. The group also indicated the challenge to master the reflective thinking skills, as they progressed in this course, and the fact that they had to do everything online made the challenge even more consequential, as everyone in the learning environment had access to view each other's development. However, due to spatial limitations for this paper, details of the data analysis will be presented during the conference paper presentation at a later date.

Conclusions

In the beginning of CALL course, many of these trainees were hesitant about publishing tasks and assignments on the web. However, they gradually performed better in the following tasks, particularly those that involved team-oriented discussions. The responses of the students were overwhelming, and the quality of their contribution to specific tasks was notably better than their performance in previous courses. Some of the factors that were found to influence the success of conducting a web-based instruction learning in the teacher-training program, as such reported in this study, include prior knowledge and skills in ICT. Based on the observations and findings from the questionnaire, the web-based platform used to encourage reflective thinking worked for these teacher trainees – they grew to become more responsive toward the subject matter, and they invested more than what they had predicted from the initial stage of the course. Hopefully they will graduate with a better perspective about teaching and learning, as they become more receptive toward the journey of the mind in its quest for knowledge and education.

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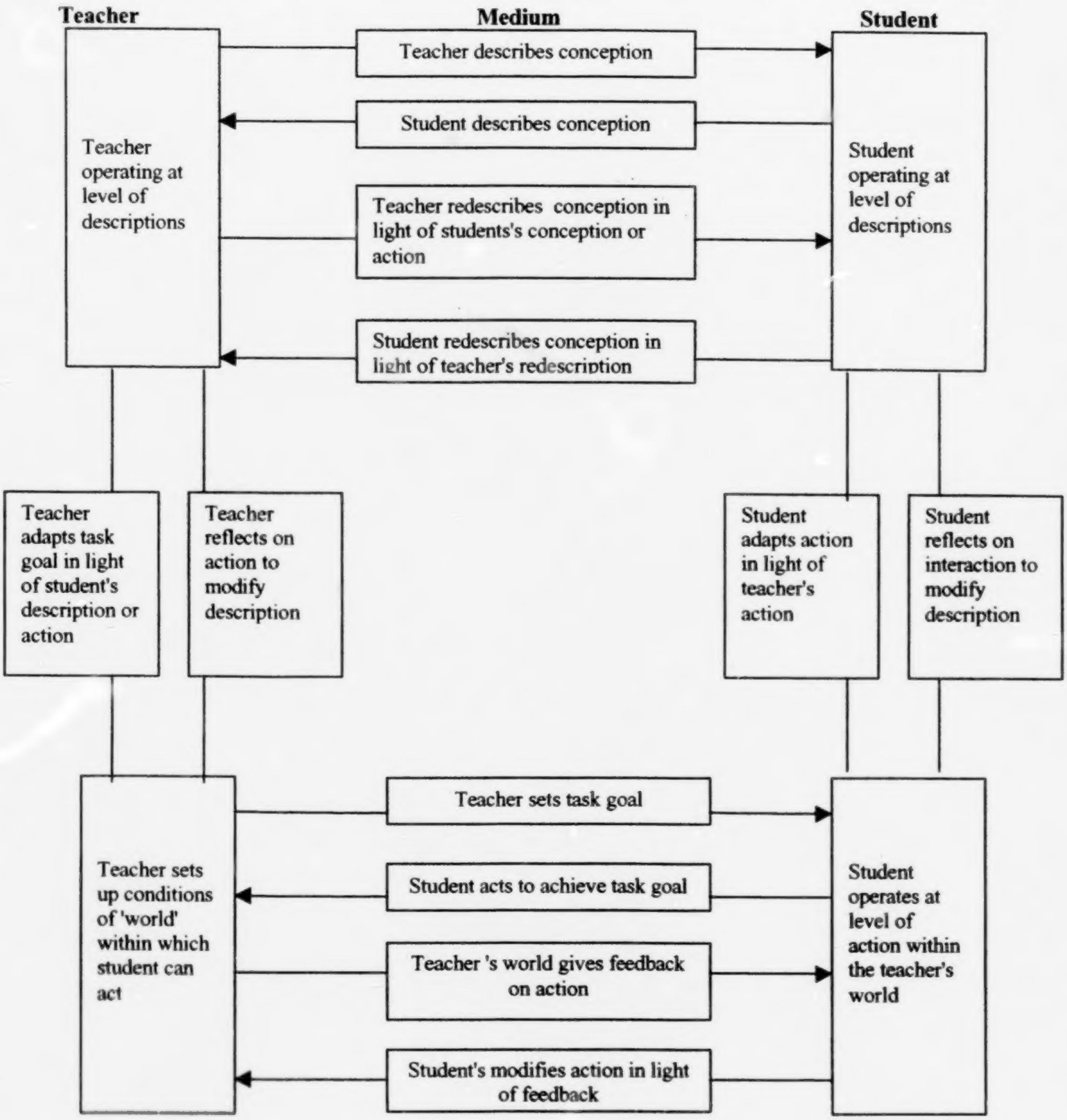
Teacher
Medium
Student
Teacher describes conception
Student describes conception
Teacher operating at level of descriptions
Student operating at level of descriptions
Teacher redescribes conception in light of students's conception or action
Student redescribes conception in light of teacher's redescription
Teacher adapts task goal in light of student's description or action
Teacher reflects on action to modify description
Student adapts action in light of teacher's action
Student reflects on interaction to modify description
Teacher sets task goal
Student acts to achieve task goal
Teacher sets up conditions of 'world' within which student can act
Student operates at level of action within the teacher's world
Teacher 's world gives feedback on action
Student's modifies action in light of feedback

Figure 3. The "conversational framework" adapted from Laurillard (1993) that identifies the activities involves in the reflective learning process.

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DISTANCE EDUCATION BASED ON COMPUTER NETWORKS IN CHILE
UNIVERSIDAD DE CONCEPCION A SPECIAL CASE.

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ABSTRACT:

Distance Education based on digital computers has evolved in the last four years in Chile. The main educational institutions who develop experiences in the field are Universities, some public companies and some group of private firms. The technology used to support distance education goes from www sites, to specifically distance education oriented software. The first part of the paper includes a brief summary of the principal experiences in Chile. The second part describes a very interesting case related to Universidad de Concepción who develop a technological platform for distance education in the early 1998, thanks to a grant for educational development given by the "Ministerio de Educación de Chile". The paper describes this experience emphasizing the capabilties of the system to implement important teaching and learning considerations, such as: Education based on learning rather than teaching, Open learning, Personal and group interaction, Flexibility in teaching support, Discussion and Knowledge space to be shared by students and teacher, Autoevaluation, Learning material distribution and many others. Finally the paper discusses the "new" role of the teacher in this type of environment as a key component to improve the quality of education. The presentation includes a real demonstration of distance education of some courses given during 1999.

1.- Introduction.

Distance education born as a need to extend teaching capabilities to students that could not access the regular education system, due to geographic distances or because of the impossibility to perform time schedules. The first expressions of distance were education based on the distribution of learning materials and instructions by mail. Technological advances such as telephone, fax and later television and electronic mail, introduced significants improvements.

The experiences developed at Universidad de Concepción about this topic, considered Distance Education as a teaching – learning environment based on computer networks, in which participants interact trough a man-computer interface that facilitates the development of their role as a teacher and as a student

The first steps were given at the beginning of 1998, strengthen importantly thanks to a grant for Institutional Development (Education Ministry), the project was conducted by María Inés Solar (Education Faculty) together with José Durán (Engineering Faculty) and the technical support of specialists Mónica Salazar and Paola Pizarro.

2.-State of the art of Distance Education based on computer networks in Chile

2.1 Distance education based on computer networks in chilean universities began less than 4 years ago. The first experiences used the www environment to implement virtual classes, less than 8 Universities could be considered as pioneers using this methodology, A few of them are using rigth now special oriented software for distance education (Learning Space, and in one special case a Proper technological platform : Universidad de Concepción).

Speaking about organization oriented to develop distance education we find different models, the principals are

- Dirección de Educación a Distancia-Teleduc : Aula continua 2000 and Quinto Campus
  (Universidad Católica de Chile)
- Universidad Virtual
  (Universidad Técnica Federico Santa María)
- Programa académico de Educación a Distancia
  (Universidad de Concepción)
- Programa Aula 21
  (Universidad de Chile)

2.2 Distance education based on TV network, the very important experience corresponds to Universidad Catolica de Chile , Teleduc a National organization with 17 Regional offices that operates for more than 15 years.

2.3 Distance education based on video-conference (ATM technology) an important group of 9 National Universities are working together around the proyect REUNA II Virtual University, the video conference network has been recently inaugurated.

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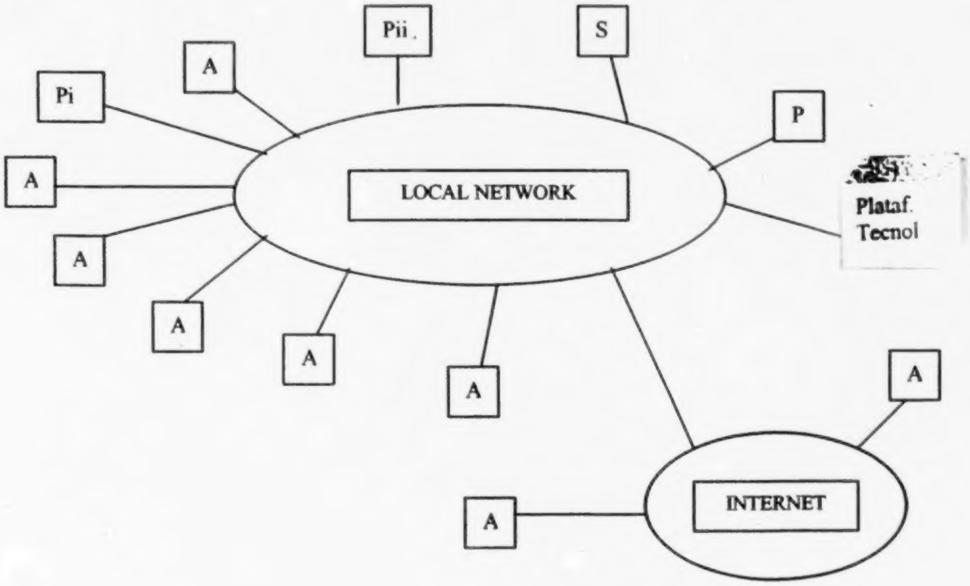
3.- Modeling of Distance Education at Universidad de Concepción, Chile

It could be explained through the following components

- Technological environment : a set of technical components(Information technologies, computer network, personal computers, complementary equipment,internet connectivity) organized in such a way that they facilitate the development of teaching-learning processes.
- Actors or participants of the educational process :
  - Student (as individual or as a group)
  - Professor and / or teaching team (main professor , auxiliary professors , facilitators,
  - Other professionals, such as : psychologist, pedagogist, sociologist, etc.)
  - Technical support for students and professors.
- Technological platform or man-computer interface (explained in detail later on)

PICTORIAL MODEL OF DISTANCE EDUCATION BASED ON COMPUTER NETWORK



4.- Working environment using the technological platform

Technically speaking the technological platform is a computer programming system that support teaching-learning processes in a distance education mode based on networks, to help teachers, students, and facilitators .

The system was designed and implemented at Universidad de Concepción and operates under Internet environment .

The building of the system began in january 1998 and started to be used in april of the same year supporting three undergraduate courses of the Engineering Faculty. The use of the platform increased significantly since then, recently was utilized to support a National distance education course for teachers of secondary level (9th year) that are facing a national education reform. The initial registration of this course was approximately 5000 professors, connected through Internet along with Chile.

The use of the platform is being used partially by Engineering, Medicine, Education, Economy and Agriculture Engineering.

The functionality of the platform satisfy the following needs :

- Display of norms and academic regulations
- Personal data
- Micro design of the activities of the course (academic planning, instructional material organization, etc.)
- Development of the course activities (execution of personal and group activities, evaluations, discussions, etc.)
- Process Statistics
- Methodology evaluation

The teaching-learning environment displayed by the platform for the teacher and students, according with experiences obtained since 1998 for at least 50 courses at undergraduate and professional level (aproximately 1200 students in total), shows that it is perfectly possible to integrate the following curriculum components :

- Participants Interaction
- Space to make free questions, privately or public, to one or to many participants
- Space to participate in discussions
- Space to find and retrieve knowledge offered by INTERNET
- Opportunities for the multidisciplinary interaction
- Capacity to get dinamic processes in communications, evaluations, collaborating work,etc.
- Flexibility to introduce changes in the degree of pressence or face to face activities
- Resources to introduce adecuate students motivation just in time
- Capacity to make decisions permanently about the teaching – learning processes, from the very beginning (microplanning), to the postevaluation

5.- The role of the professor in the new teaching-learning environment

In this learning environment, the professor accomplish in rather different ways the traditional responsabilities assigned to him, due to the introduction of new tools to communicate, to produce, distribute and present learning materials, he has to change the way things were doing.

On the other hand, the nature of digital electronic information, brings with it, new ways to process, distribute, manage, and operate the information, producing benefits and new problems

Probably the internal learning process of the student in the transition stage does not change but the whole external atmosphere evidently changes.

Practice is showing that the role of the professor changes. Actually the use of the platform during distance classes show that the professor emphasize the following aspect:

- Plan in advance all the activities covered by the course (microdesign)
- Orient, guide, direct, all the educational activities of the students.
- Facilitates the communication processes between students and him, or between students and students, or between students and other participants
- Evaluates the learning processes increasing the scope of evaluation .
  (Co-evaluation, Group evaluation, Autoevaluation, conventional evaluation)

6.- Usability conditions and grade of accomplishment of the platform

The realization of distance education experiences at Universidad de Concepción and the analysis and evaluation of them, validate conclusions about the grade of satisfaction of usability conditions.

- Open, friendly and flexible environment for the participants. Students communicate, ask questions, express their opinions and collaborate efficiently – The following capabilities of the platform help : Asincronism, Network working environment, Discussions site, IRC chat, and interaction trough Internet

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- Thinking estimulation, and Creative disposition – Guided and oriented participation of the students during discussions, consults, and assignments using the technological tools provided by the platform
- Open to professor creativeness – Thanks to the new technological resources permanently evolving, the professors have the oportunity to experience new ways to improve teaching
  (multimedia resources, videoconference, simulation, etc.)
- Apply the best leading style to stimulate participation, develop values, and motivate – Depending on the initiative of the professor the platform itself could help or at least be neutral.
- Promote the collaborative work – Thanks to the facilities of the platform students can develop, coordinate, revise, and build reports or exchange knowledge in benefit of all.
  (chat, sharing files, compartir archivos, e-mail, etc.)
- Stimulate the metacognitive thinking – The introduction of frequent autoevaluation, the access to the fantastic world of Internet and other resources can influence the personal learning, giving clues to advance, or turn back in the plan of activities.

Telematics in Professional Training: New Horizons and Possibilities

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Abstract: Todays information and communication technologies have offered many possibilities for activity when applied to education. However, these various applications usually occur in the usual teaching/learning environments (schools, universities, centres of study and research) and are used by operators for whom study is their prime activity. The objective of this paper is to indicate the possibilities offered by telematics as a tool for access to professional training by users for whom access to these resources is not usually easy: civil construction workers. The principle theories and in results obtained in the implementation of a web site directed at the training of civil construction workers in the reading and interpretation of architectural plans are presented employing an interdisciplinary approach involving architecture, engineering, education, psychology, and information technology.

Introduction

The present conditions of technological development do not always provide the necessary professional qualifications for all those who are involved in the different stages of a productive process. In the civil construction industry, the training of planners and designers is guaranteed in various circumstances (universities, technical courses, trades unions) the same does not apply to the workers entrusted with constructing a building. Due to this, in the specific panorama of the countries of the third world, poles of technological excellence coexist alongside a large contingent of workers who remain at the margin of processes of qualification. in these conditions, the professional training of these workers happens in a large number of cases in an informal manner, as technical knowledge transmitted from one worker to another alongside the construction itself. Due to the precariousness and unsystematic character in which it occurs, this model of training has not been shown to be the most appropriate, principally with regard to new constructive processes and techniques where the capacity of anticipation is one of the demanding requirements.

As a solution for this impasse, providing conditions of access to training and qualification for workers is one of the departures in the search for standards of quality compatible with the requirements of those peculiar situations. In that context, continuing education based on current technological resources, appears to be a possible solution to face the new requirements of qualification. In agreement with Cardona (1995), the training of human resources in obsolete technologies can result in an underutilisation of human potential (and later in unemployment or underemployment), as a result of traditional training processes being out of phase with the path of technological development.

The Role of Graphic Representation

Graphic representation by means of technical drawing has been acquiring a larger importance everyday in the field of new industrial technologies, because of its capacity of allowing elaboration, anticipation, control and the checking of solutions to spatial problems, extending into numerous fields of activity (Bessot and Verillon, 1993). Containing information of a spatial nature, plans, maps, diagrams, technical or geometric drawings become indispensable tools for the realisation of numerous professional tasks: to manufacture a machine part, to locate an object, to find one´s way around a city, to build a house, are tasks which are optimised when accompanied by information about the spatial nature of activity in question.

In architecture and civil construction particularly, this information comes before the stage of the construction of a building, permitting a control over the whole constructive process and informing all those involved of the procedures to be adopted. In this sense, the correct understanding of the graphic codes of preliminary representation of the architectural space is one of the necessary conditions for a professional performance within the standards of quality demanded by industry and consumers, not only on the part of workers charged with the construction stage, but on that of everybody directly or indirectly involved with a building work.

The absence of this knowledge on the part of the workers is reflected in the whole execution of a building, causing them to constantly request further information, resulting in loss of time and several disruptions to the productive process (Rabardel and Weill-Fasina, 1995). This is without speaking of the losses of material due to waste, caused as much by the use of incorrect amounts of materials as by rebuilding.

The establishment of clear concepts, based on norms of representation of universal acceptance defined by the Technical Rules manifested by Technical Drawing requires a formal intervention, a way of guaranteeing unified standards of understanding and identification on the part of the professionals involved. Due to the restricted opportunities of professional training becoming more precarious in post-war periods, allied with the characteristic mobility of workers in the civil construction industry, these interventions occur in an informal way in the working environment, which is not the most appropriate manner for professional qualification. Unlike the techniques of training in the workplace which are planned in advance and have the necessary resources for an activity of educational qualification (training "on the job"), training on the building site is sporadic and unplanned, raising doubts concerning its effectiveness.

In this way a favourable scenario takes shape for experiences which, using new technologies in a more extensive manner may take care of some aspects of professional training, not only in normal conditions, but also in moments of crisis. To this end, a pioneer project, at least on a Brazilian level, is being proposed, for the training of civil construction workers using resources available on the World Wide Web (WWW), where one aspect of this training is addressed: the reading and interpretation of the graphic codes of representation of architecture.

Telematic Networks For Professional Training

The WWW is now the standard interface in telematic communication (telecommunications + computer science), incorporating multimedia resources - text, sound, animation, videos - and permitting fast and efficient communication between geographically distant users. Its exponential growth -estimated to be one billion people at the turn of the century - leaves no remaining doubts about the importance of this form of communication , when reaching such impressive numbers, although all the effects (cultural, economic, strategic, social, etc.) of this new form of communication are still not all known (Negroponte, 1995). But they will certainly be significant and profound.

The dynamic and diversified character of the Internet, besides its practically limitless reach - in spite of numerous technical/economic even political restrictions - make it an important means of communication and interaction with potential educational implications. The resources offered and supported make the network one of the technological apparatuses which has been most attracting the attention of researchers from all areas, to the point of classifying it as the most explosive communication phenomenon of the century (Galbreath, 1997), or the invention that has most changed the world since the invention of movable type by Gutenberg (Descy, 1997; Maddux and Johnson, 1997).

The technical resources available on the Internet (animation, simulation, virtual reality, etc.), its wide geographical reach, the more and more friendly character of navigation, associated with the possibility of interaction and cooperation among users, show themselves to be important tools for the construction and/or recovery of the knowledge necessary for a good professional role. Besides this, it can provide support for the necessary requirements pointed out by Roca Villa (1994), for general training and, especially, the professional training or requalification of workers in future years: personalised, flexible, based on resources, interactive, accessible when necessary ("just in time learning") training.

But it is in what Levy (1998) calls a "new relationship with the knowledged" that is found one of the most significant differences in relation to conventional pedagogic practices, to the extent that these new technologies amplify, externalise and modify human cognitive functions, providing new forms of access to information and new styles of reasoning and knowledge. The productive processes are modified by emergent paradigms, in the same way that knowledge is, as new models and spaces of knowledge are created, open, continuous, fluid, not linear, reorganised in accordance with objectives or contexts, in contrast with linear and parallel scales, structured by levels and prerequisites, converging on "superior" knowledge (author's quotation marks).

Simulation, virtual reality, communication on a global network, artificial intelligence, multimedia, interactivity, become the new forms by which knowledge is being made available, symbolised and represented, generating new ways of knowing that develop the imagination and intuition much more than previously. According to Moraes (1998), the amplification of the spaces through which knowledge and the changes of knowledge come and go requires that individuals are made literate in the use of electronic/computer equipment and resources, enabling them to produce, store, disseminate and benefit from knowledge through its new forms of digital representation. It is not, therefore, only a new support, but a new form of connection, construction and production which establishes itself far from the monopoly of the institution/teacher, and open for autonomy and wider participation.

Possibilities For Action And Possible Approaches

The activity of the recovery of the professional qualification of workers finds in the Internet a virtual environment of training compatible with the characteristic mobility of workers, at the same time that it adapts to the new productive paradigms directed towards professional qualification, seeking to reach desirable levels of quality and productivity. The use of educational sites represents one of the most promising resources offered by the Internet, because the possibilities of interaction and cooperation, through consultation, the exchange of messages, etc.

This perspective implies profound changes in the educational system, once aspects such as personal differences, cognitive styles, learning rhythm, affinities, areas of interest, thought strategies, and motivation, which until that then have been unconsidered, start to have relevance . It implies, equally, changes on the part of teachers, methodology, curriculum, material and didactic resources, evaluation, physical space and timetables, considerably enlarging the range of possibilities of educational activity, so that they can incorporate the resources offered by new technologies.

Based on these precepts, Jonassen (1998) describes the characteristics that he called "significant learning", or the process of teaching-learning based on the constructivist perspective. Arguing that these new technologies can support thought that deals with these qualities, the author describes them thus:

- Active: taking risks, through experiences and actions, supplies solidity for the learning process. The experience acquired in the activity and the manipulation of the tools of change are essential in this type of approach;
- Constructive : meaning is built by means of previous knowledge;
- Reflexive : experience is not enough for learning. It is necessary to reflect and analyse, to articulate the decisions, strategies and answers found. When the student articulates what has been learnt and reflects on the processes of decision adopted, s/he understands more and has more capacity to apply the constructed knowledge;
- Collaborative: explores the abilities of each person, supplying support and approval in the construction of individual and collective knowledge and learning ;
- Intentional : the fixing of goals and objectives articulates and directs thinking, action and learning towards attainment;
- Complex: opposing itself to the apparent simplicity and reliability of the contemporary world, it adapts to its complexity, irregularity and lack of structure;
- Contextual: developed through significant activities in the real or simulated world, they acquire more consistent meanings when transferred or applied to other situations;
- Colloquial : the exchange of opinions and ideas becomes a social activity that can be put to the service of the construction of knowledge .

All these characteristics are interrelated, interactive and interdependent, requiring that the educational activities based on these frames of reference conform with the largest possible number of approaches, because these characteristics are synergetic, that is, their combination results in learning processes broader than the individual characteristics used separately (Jonassen, 1998).

Furthermore, according to the author, the potential of the various technologies mediated by the computer is favourable to the development of new pedagogic focuses that prioritise constructivist frames of reference, in distance learning, as well as the classroom mode. Teaching and working collaboratively, contextually, with interaction, simulation, and virtual çngagement with the object have been permitting the development of new pedagogic focuses towards an approach to instruction centred on the subject, no longer emphasising the teacher as the source and arbiter of all knowledge.

The Site

Taking these presuppositions as a base, the site 'The Reading and Interpretation of Plans' is being developed, available at the http://www.ufrgs.br/des/plantas/index (access password available on request from aacc@vortex.ufrgs.br) designed specifically to respond to the needs of civil construction workers. Its aim is to be a virtual space of information, exploration and construction of knowledge, where the basic principles of the graphic representation of constructed space are formalised. Furthermore it becomes an environment for familiarising these users with the possibilities offered by information technology, and the Internet in particular.

Constructed around four thematic axes - drawing, design, the reading of plans, and civil construction - the site employs simple language arranged in short paragraphs, seeking to adapt itself to the characteristic of the subjects. its structure is based on frames as a way of permitting rapid access to all the contents in an order defined by the user him/herself. Furthermore, animations, and applications in dynamic html and JavaScript are other resources employed.

But the principal difference of the site is not the use of the latest generation of technological resources, but the simple manner in which the resources are employed in an approach directed towards users who are interacting with technological resources. Instead of presenting all the content with ready answers, situations are presented in which the user him/herself has to construct his/her hypothesis from situations experienced in the routine procedures of working alongside the construction itself, and reproduced on the screen. A space is also anticipated for the resolution of doubts and exchange of information between participants. The construction of a glossary of words and technical terms employed in civil construction will be made incorporating contributions from the participants. In this way, by recording their contributions, they will be formalising these contents.

These characteristics, allied with the dynamism of the Internet, make the site a place of constant change and up-dating, since each participation can lead to reformations and redirections, permitting a constant updating of contents and/or approaches.

Results

The first results obtained from pilot use give an account of the appropriateness of the means of information technology and telematics in the forming/recovery of knowledge necessary for the professional activities of civil construction workers. Workers invited to interact with the site in an experimental way confirmed data obtained in previous research (Cattani, 1998) which gave an account of the existence of potentially favourable conditions for the employment of the resources of information technology in the training and qualification of these workers. There are indications that the difficulties of use of computer resources on the part of adult subjects with little formal schooling are due more to material conditions (the concrete difficulty of access to equipment) than to cognitive limitations. The fears, suspicions, doubts and insecurities demonstrated by workers were no different from those of educated adults on their first interaction with a computer.

These data permit deductions upon the viability of experiences which employ this technology directed to these specific users, as well as confirming the course followed in the theoretical frames of reference of the development and refinement of the site.

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The Integration University – School in the Development of Colaborative Projects Through Internet

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Abstract: The first experience of the Universidad Tecnologica of Panama and the Instituto Episcopal San Cristobal, in the development of educative projects collaboration through Internet, go back from the year 1994, with the creation of the project "Enviroment and Contaminated Atmosphere", with the fulfillment between educational institutes from Panama and Brasil, with the mediation of the Universidad Federal of Rio de Janeiro and the Universidad Tecnologica of Panama.

The results obtained in the entirely development with the various projects, in addition to strengthen the relation between University – School permit the identification of the group of aspects to consider in the planning and ejecution of educational projects with the medaiator of the netting.

This ponential relate the integration University – School on the development of educational projects with the collaboration through Internet, and presents identified aspects, as a priority to consider in the development of such projects.

Introduction

With the arrival of the Internet Netting to Panama in June 1994, reveled a common reality in the educational system of the region; this is; the use and access of the netting marked on the activities of higher level. The communiction and the facilities introduced with the arrival of Internet emerge out of reach of the scholar institutions of basic and middle teaching. The public schools were in disidvantage because they didn't have the necessary conditions for establishing the use of a net in their installation, since there wasn't a national policy that could suprevise the installation of a net in the educational system.

The Instituto Episcopal San Cristóbal, a private school in the Republic of Panama which attends to students from Pre-School up 12^{Th} grade, in 1994 showed interest in the developing experiences with the Universidad Tecnológica, UTP, with the enclosure of works applied to the process of teaching learning. Due to the fact that the Universidad Tecnológica attends hihger studies and the fact that the time, equipped with Internet, the need to work with school, here or abroad, interested in participating in the project with Panamanian schools, based on the agreement of cooperation between the Universidad Tecnológica de Panamá and the Universidad Federal de Río de Janeiro, we were able to contact a school, in Brasil, which presented the profile needed in order to develop the work .

The experiences began with the project "The Environment and Its Contamination" inteded to develop the practice of distance investigations taking advantage of the use of the e-mail and other resources available through the net of Internet. The general objective that oriented the definition and the development of the project was: to establish the communication and cooperative work, via Internet, between students of different cultural environment, with a present day topic of world interest (Clunie, 1996), with the participation of students from

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the 9th grade of high school, between the ages of 13 and 15. The communications were sent in the languages of each country, Portuguese and Spanish.

After the first year of work, the coordinating teams of Panama and Brasil concluded that: (i) the experience was intellectually rich, allowing the exchange of information in both languages and the preparation of the conclusion in relation to topic worked on; (ii) in the social aspect new relationships were established with inter and intra working groups, this is within the working groups of each country and with the colleagues of the invited country: and (iii) the possibility to work with a new technique stimulated, the students work in a spontaneous way. why the integration of University- Schools.

Why the integration of University – School?

Actually it's common to encounter with teaching institute who posses Informatic Laboratory, most of them well equiped and with access to Internet; where the machines "have eternal rest". This situation due to the fact that the faculty and others public employees were not prepared on the adequate use of the New Technology and it's respective application in the educational process and in the educational administration activities (Clunie, 1992). The truth that is frequently found in the institutions is that the resources are installed in the laboratories and abandoned to self-learning of the users, subtracting importance to the process of updating and incentivating the board of educators.

In the process of the university activities, the task of investigations prevail, and it is a necessary condition to continuosly update the board educators. This premise was extensive to all the activities and projects that develops the university, at an intern level or with the participation of outward colaborators. The agreement of cooperation between the Instituto Episcopal San Cristobal and the Universidad Tecnologica of Panama, is based on this last object, on which we emphazise: (I) To promote and to impel the scientific exchange, technology and cultural with the foreign or national institution and cooperates with these last in the solution of the technological problem at a high level, of their ability and, (II) to bond enlargement of the aciton of educational system to the production process, through the investigation of educational technology to fce the problem of the country.

To have as a mark of reference the university poltical, expressed before and considering that in the university there are specialist in technique appliance, it's fundamental for the exit of all experience that entail with the new technology to the educational process, to count with the participation of personal specialized with a mastery knowlodge and qualification of the fculty of the educational center in the use and application of the technique. The agreement of cooperation between the Universidad Tecnologica of Panama and the Instituto Episcopal San Cristobal, in this present case, vialize and guarantee the fulfillment of these objectives planned.

Team Work

Through the collaboration, a model in which the social and the self-esteem coexistence are increased , is being built, with the academic success which can ruly on tools that make the communication and motivation of the participants easier, basing the individual learning through the communication and the search to reach the common objective. The conscencious ness of groups is the catalyst agent that makes the construction of the collective knowledge through knowledge and individual learning possible.

Team work lays the foundation of peer learning, resulting in an alternate way to the traditional teaching process that creates rivalry between the students. Instead of rivalry there is mutual help.

Investigations made with children between the ages of 7 and 8 who were studying in the 2nd grade of elementary concluded that (Lucena, 1997):

- To group children in pairs resulted of great importance and motivation for the development of writing and recognition.
- Peer work, along with the existing facilities, drove the children to acquire mor confidence to: (i) change their troughts into comprehensible writting; (ii) to write with more freedom, without been scared of making mistakes and (iii) increase then self.esteem in the presentation of the works.

Without subtracting from the importance of maturity (operation) as a determiner of the process of human development, Barbosa Goulart calls the attention to cooperation, this is the process of development. Of the operations of the social coexistence confirming that "in the exchange of their equals, individuals acquire autonomy" (Goulart, 1991)

Colaborative Projects through Internet

Investigations in educational technology suggest the use of new sociopedagogical approaches integrated to the technology of the computer nets. The nets facilitate communication for the users, permitting them to communicative and to exchange information. This gives then feeling of participation and responsability for the learning that is being construted. The schools gain more life, and as more students participate actively in the construction of knowledge they gain more autonomy and independence in relation to their knowledge.

The fulfillment of diverses activities and situations of learning in a netting atmosphere establish an excellent opportunity for the individual or exchange groups. The individual can work colaborating in a collective form, investigating, exchanging information developing the crativity, playing, elaborating projects, building knowledge, learning to learn, or simple, communicating between friends. The timid students in class, find in the netting more liberty to exposed and to test their ideas. This meaning, when it's apply in an adequate way, the use of the netting becomes a very valuable work toal, compatible with the present necessity of educational process.

The Planning and Execution of Educational Projects through Nets

In the mark of an agreement the cooperation University – School, and a result of the experience gain in the development of projects, through Internet, we identify substitute appereance considering the designs, planning and the carrying out of projects through the netting. These are:

- *Foundation:* Every educational project should respond to a determine form of under standing the process of teaching and learning. It should explain why its being done by presenting its stages of development, work methodology goals and limitations.
- *Objectives:* the global objectives and the objectives of each phase should be stated clearly.
- *Population:* the participants should be indentified clearly.
- *Activities:* to get the work done correctly it is fundamental to identify each of the activities that would be done in every phase of the project.
- *Resources:* They are aspects to be considered in order to guarantee the successful development of the project. The human resource participating should be indentified, and be expected to coordinate and help with the work and the computer resources such as the hardware and the software that is used for the project.

During the development of the project the following steps should be followed:

- Every project should have a responsable work group that would supervise and make sure that all of the activities will be done according to the design and work plans.
- A specialist on content should follow up on the project and revise the work done by the students. Enfases should be made on aspects such as occuracy of information that is being worked on. This will give the participants confidence and will give the participants confidence and will give credibility to the project.
- One of the teachers participating in the project should check the information generated by the students checking the Grammar, the vocabulary and forms of expression that do not attempt against the integrity and morale of the partctpants.
- Someone incharge of support should permanently check the proper use and updating of the work resources(hardware and software) necessary for the development of the project.
- The entire grupo should develop dinamics that stimulate the activities in and out of the installation where the projects is developing.

The Experience of University-School Intergration

The united development of projects between the Universidad Tecnologica of Panama and the Instituto Episcopal San Cristobal, surpasses the frontier of the initial project "The Enviroment and Its Contamination". The experience was fortified with the arrival of the Project KIDLINK to Panama, in 1997. From then they have develop diverse project in the mark of KIDLINK with the colaboration and orientation of the Educational Informatic Department. Between KIDLINK, due the nature of work they are developing, they emphazise the activities developed as: (I) Discussion list for Adults; (II) Colaborative individuals projects; (III) Colaboratives projects between collage; (IV) Translation in multiple languages; (V) Children Art in the net; and (VI) Conversation in real time and others. The colaborative projects for individuals or inter school are among the different activities that are done.

Conclusion

From the experience acquired in the setting of the agreement of cooperation between the Universidad Tecnologica of Panama and the Instituto Episcopal San Cristobal, we concluded that:

- The work through the net constitutes new environment of learning that make it easy for free exchange of ideas and favors development of knowledge .
- Internet emerges like a powerful ally in the process of teaching – learning facilitating the access to varied and actualized information.
- The colaborative work is stimulating, it sets the bases for colaborative learning, resulting as an alternative form to the process of traditional teaching permitting the development of important and new characteristic values in youths.

Future View

With the intention to accompany the advances of technology, at the present time we work on the design of new projects that will enrichen the motivation and increase the participation within the setting of the University School integration, we are placed in the phase of planning for the Video Conference project, which refers to the use of the multimedia technology for the exchange of ideas and the development of projects through the net.

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Teachers and Trainee Teachers Perceptions about Information and Communication Technology Tools during a Multicultural European Activity

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Abstract: The main objective of this paper, is to report the activity of a multicultural and Cross Country European activity : " the communication weeks " focused on three items :

- Teacher Educators and Trainee Teachers needs
- Information and Communication Technology (I.C.T) as educational tools
- Intrinsic qualities and draw back of ICT tools

The specific interest of these communication weeks is that it took place in ordinary situations and give an opportunity to present the point of views of European users working together in order to point out the pedagogical problematic about the use of ICT tools and to illustrate the actors perceptions. We choose to present this paper in actual words of these participants so that their voices are clearly heard.

The users conclusions underline the fact that there is an awareness about their changing role through the use of Information and Communication Technology. They argue for the integration of ICT tools in their pedagogical practices in training course and curricular.

Introduction

Different Institutes of Teacher Education (pre-service education and in-service training) in England, Finland, France, Portugal and Switzerland, decided to carry out **" Communication weeks "** from january to June 1997, in order to develop a network between project partners and users for a limited period of time (two weeks). These Communication weeks aimed at enabling Teacher Educators and Trainee Teachers to communicate about Information and Communication Technology (I.C.T) tools by using synchronous and asynchronous tools such as forums, videoconferencing, e-mail... This collaboration has been held by the research project FETICHE (Formation des Enseignants aux Techniques de l'Information et de la Communication : CHangements et Evolution) within the framework of the European program Socrates[1].

This experiment used the local environment that took place in ordinary situation and circumstances. Small and disparate groups were involved. The priority was to support people's involvement in relevant cross country communication. Observing and analyzing was our second objective in order to identify the lessons to be learned from such an European co-operation. This paper gives a brief description of the setting of this communication weeks (1) and the results of a small scale questionnaire pointing out the users needs (2), The ICT as educational tools (3) and their qualities and drawbacks (4). More details can be found in the full report (Bessiere, Blackeley, Pierrou 1997) and on the Fetiche Web site[2].

1. The setting up

The preparation of such an event required a lot of energy among the Fetiche team in order to coordinate, to organize and to build a global agreement among team members.
Some prerequisite were handled, particularly :

- Basket of technology concretely available and ready to use (specially for the multipoint videoconferencing)
- Choice of an animator "boosting" the process in each country.

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[1] This project already finished, would continue for year 2000 (we are waiting for the agreement).
[2] http://ictt2.ec-lyon.fr/fetiche/

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- Choice of participants with a minimal training

1.1 Identification of the participants

As we were in a distant context, we tried to give to the participants the possibility to be immediately in contact with this technology not only as observers but as real actors. Therefore, their first task was to introduce themselves before entering the conference (forum) by filling a form. This form was public and we could read 39 presentations. It's noticeable that a half of the participants were mainly Trainee Teachers and had some previous experience of collaboration at European scale. Most of them used to travel in Europe for their professional activities, and half already used e-mails for European Collaboration.

In the Hobbies section, the following are classical entries: " *reading* ", " *swimming* ", " *fishing* ", " *cinema* " but also: " *Telecommunications* ", " *My favorite hobbies are...going out with friends and lately netsurfing* ", " *...Travelling and netsurfing !* ", " *Computer* ", " *surf the net* ", *but* their personal interests and working life indicate experience using ICTs: " *...I am in charge of ICT at the IUFM* ", " *Teacher training in English ICT projects in education (videoconferencing, WWW, E-mail...)* ", " *...developing distant learning materials ...* ", " *I have 4 hours a week with my students in English for 2 years and one of these hours is with the computer* "...

It's clear that they are probably more familiar with e-mail than the average Teacher or Trainee Teacher: this is due to the fact they belong to institutions which are active in this field (thanks to Fetiche and other projects).

If we cross this identification form with the information coming from the questionnaires (48 answers), we can add, that most participants where young (less than 30 years old), mainly woman, and it is the students (Trainee Teachers) who massively answered. This is a positive indicator corresponding to one of our main objectives for this activity " involving Trainee Teachers " with a basket of media.

1.2 Media used

We try to find a basket of technology, mixing asynchronous and synchronous media, in order to give a representative pallet on what we call ICT tools. During the Communication Weeks, we never used the expression "New Tools for Teaching or Learning" or "New Technologies and training". This terminological orientation was for the project team the opportunity to offer a large choice of New technology tools used in different fields and let the participants appreciate if those tools could be used, in a learning or teaching situation : "L'enseignement ne génère pas de nouvelles techniques – affirme Robert Quinot (1986) – de l'audiovisuel à la télématique, elles sont introduites par effractions successives…L'enseignement utilise traditionnellement des aides qu'il adapte, comme les instruments de mesure, (…) les maquettes en sciences physiques (…)"[3] and we could add the new technologies for learning and teaching.

The following summary table shows the overall technologies used.

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[3] Translation by the authors : "Teaching doesn't generate new technologies – said Robert Quinot (1986) – from audiovisuals to telematics, they are introduced by successive break-in…Teaching traditionally use some aids which are adapted, as measure instruments, (…) scale models in physical sciences (…)"

Technolgy	Aims
e-mail	90 % of the organisation of the communication weeks was done by e-mail. But it was just used between the team members. The participants, has they had the forum, used it hardly ever.
Teleconferencing "Bring people together to discuss in real or differed time" (Laurillard, 1993, p. 164)	**The forum** was dedicated to the reflexive and collaborative part of the Activity. This conference, called 'asynchronous' - where each participant writes or answers to a message when it is convenient for him – was one way of meeting and discussing. In this forum you found 10 main threads in order to discuss about pedagogy, teaching and learning approaches using new technology.
	The videoconferencing was used for real time and immediate feed-back. Videoconferencing was intended to be one of the project's synchronous tools enabling participants to get to know one another for instance people which whom they communicate at distance in the asynchronous mode on the forum, to discuss at distance on various topics seen in the forum and learn more of how to use the medium.
Web site "The Daily Mirror"	A web site, called Fetiche Web site has been held at first for the project team. For this specific event, a Communication Weeks menu was created. This medium was open to the participants in order to informed them, about different subjects concerning the communication weeks, but also on the aim of the whole project. The web was principally a tool for the circulation of up-dated information but also the "collector" of reactions, thanks to the built-in questionnaires. The participants had to go to the web for filling the initial and final questionnaire.

Table 1 : the basket of tools used during the communication weeks

1.3 Methodological approach and observation tools

The Communication Weeks was an European experiment using the local environment and composed of small and disparate groups. **For these reasons we choose to have a qualitative approach.** We prepared specific observation tools which were handled and used by each field partner, in order to evaluate this event such as : *Automatic files* (e.g.: log files from machines), *individual data* given by each participant (e.g.: individual presentation form) and *two questionnaires* (the first starting individual questionnaire planned to be completed by all participants at the start of the Communication Weeks and the second final individual questionnaire planned to be completed at the end) available on the web server, about the interest and the limits of the pedagogical functions of each medium used and about the Communication Weeks as a whole. As we were in a real situation distributed over 5 sites, different problems occurred for some of the participants : the starting questionnaire (41 answers) and final questionnaire (26 answers) are anonymous and do not allow personal identification of initial and final responses by a given participant. Only overall comparisons are possible. In addition, a number of participants did not complete the final questionnaire. We ensured, by cross-referencing certain criteria (age, sex, country, profession, etc.), that the 26 people completing final questionnaire, had also completed the starting questionnaire. With respect to methodology the "disappearance" of part of the "subjects" is a typical characteristic when observing an experiment under real conditions. So, we had to "temper" the drop-out rate (15 out of 41) of responses in the final questionnaire. We had also, *data* *provided by the coordinators* of each site (e.g.: observing the videoconference and writing comments on some key issues) , *group interview*. We built a *specific grid* for the observers of the videoconferencing. This grid is taken from Bales (1950) and adapted for our particular context. Our main objective, with these tools, was to hear the views of users. The following participants remarks concern the users needs. When they spoke of users they think principally of Teachers (Educators and Trainees).

2. Users needs

Participants had plenty to say about the users needs, the outburst of ideas, comments and suggestions are clearly expressed. Judging by the answers, the needs for Teachers can be divided in two basic categories of training : technology and its pedagogical use. But first of all there is a prerequisite : the technology has to be available.

2.1 Emphasising the required equipment

All participants asked for the required or adequate equipment. There is was a disparity concerning the equipment between the north of Europe and the south and it was also between depending from the countries. But, even when some equipment was available, most participants pointed out the difficult access and the complex organization as significant barriers on the way towards a flexible and every day integration in school training.
" *To have access to equipment, to ensure that personal aspects are catered for, especially as regards Distant Learning.* ". Female Trainee Teacher – aged 24.
" *To have free-access to the equipment (to develop the autonomy): but this is still very difficult to organise it in schools* ". Female Trainee Teacher – aged 25.
One participant sums up trainee needs very clearly:
" *basic ICT training at school - enough work stations at school - modern easy-to-use software - ICT integrated in school learning* ". Male Trainee Teacher – aged 25.

2.2 Needs for training in order to use the ICT tools

Their needs concerning training cover different aspects. The first aspect is a technical request in order to have the minimum pre-requisites : " *basic training in the use of ICT l - modern easy-to-use software - ICT integrated in the curriculum* ". Male Teacher – aged 30 , to strip the machine of its mystery : " *You find some teachers who think that they need to be a nuclear physicist to be able to approach a computer, while others just jump in and discover that it's an easy world to navigate in* ". Female Trainee Teacher – aged 26, but also to treat as something ordinary, an additional means of personal advance: " *The teachers could use some extra information about ICT, some advanced computer competencies in order to increase their knowledge, not just for teaching* ". Female Teacher – aged 33.

They are not ready to assume a technical competence and they ask massively for a resource person :
" *..Why not let the teachers get on with the job they do best, i.e. teaching and dealing with the communications portion of the exchanges, while the technicians work in the background / sidelines to help them get their job done, by smoothing out the road for them ...* " Female Teacher – aged 34.
" *...It's really like having two legs. Cut one off and you topple over. The technician is one leg and the teacher is the other...* ". Male Trainee Teacher – aged 24.
This request could be perhaps a means to overcome their fear, hesitancy and apprehension.... Their attitudes might be due to what Raub (1981) called the computer anxiety : "the complex emotional reactions that are evoked in individuals who interpret computers as personally threatening" ?

The second aspect is a pedagogical training desire to find points of reference for methodology and analysis :" *To study interaction of pedagogy and ICT* ", " *To know, and analyze different experiences developed by other people* ". Female Trainee Teacher – aged 23.
" *To have preparation in order to use ICT and be able to use it with my students in a comfortable way and also productive* ". Female Trainee Teacher – aged 22
This join the idea of the teacher posture, attitude. Some participants raised the idea to focus the training on the attitudes (rather than ICT skills) of the ICT user. The reason given for this was that the changes in software

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and hardware are so rapid that no institution can expect to be able to afford to train its members in every tool and software version use. In this situation it is necessary for people to have an **attitude** which allows and inspires them to take the responsibility of learning to oneself. They conclude saying that influencing ones attitudes through education/training is difficult but the challenge needs to be taken ...

3. ICT as educational tools

The individual opinions offered by the participants reveal two main trends concerning this subject : the role inside the teaching and learning process and the aspects of a social mediated interaction among colleagues

3.1 Teaching and learning issues

In the following summary lines we have grouped answers by participants concerning the merits and limits of ICT for learning and teaching. We have not separated learning and training because the answers we received clearly amalgamate them. An advantage for learning, for instance, is also an asset for teaching.

As we stressed above, participants were convinced of the wisdom of integrating these tools in the educational process and they consider it as an additional educational resource. But they never forget the teacher's role and they stress that those tools are only a complement of the Teaching and Learning process because the person to person contact is always essential. They also question themselves about knowledge, concluding that the ICT tools are now another important vector towards knowledge which bring additional color to the pedagogical palette: " *ICT can be a potential resource to help teaching* " Female Teacher – aged 28; " *ICT can be used to teach but we need to be careful. Pupils can exchange information with other schools, participate in projects, etc..* ". Female Trainee Teacher – aged 24; "*It another educational resource. The teacher's role is important to decide the kind of activities developed by students by the ICT* ". Female Teacher – aged 32. ICT are in the broader context of society: " *Nowadays, more and more people use new technologies, teachers must be aware of those changes.* " Male Teacher – aged 32., " *ICT is used in almost all aspects of life in the society so teaching and learning processes cannot be isolated from the trend. ICT tools give a possibility to enrich teaching and learning.* " Male Trainee Teacher – aged 26.

The emphasis is put also on a more individual approach to teaching: " *With ICT students can construct their own knowledge in their own time. They can discover a world of information* " Female Trainee Teacher – aged 25. In addition, ICT: " *... will give the learning/teaching process a new view, increasing the stimulus and the motivation* ", Male Teacher – aged 34, and a vector for communicating with other colleagues.

3.2 Mediated social interaction

Interaction and communication with other colleagues seems to be one of the major role of ICT tools. It is to be noted that our participants attach considerable importance to this point and we may wonder whether mediated communication, at a distance, does not represent a richer communication vector, bringing a form of liberty that is in some way "restricted" in a person to person relationship in which less rational forces (such as sensitivity and emotion) may take over. Interest in collaborative work is also apparent: " *We can learn a lot from others' experiences and exchanging information through ICT makes everything quicker* ". Female Trainee Teacher – aged 22. " *As a future teacher I think ICT are a new and very important tool which I can't leave aside. Although I still think we have to be very selective when it comes to the amount of information we can get! Another point is the information exchange we can rely on, thinking that somewhere out there someone is feeling the same we do and probably will help us, it is important* ". Female Trainee Teacher – aged 28; " *I don't like to work alone. Communicating with colleagues gives the opportunity of reflection and try new strategies* ". Female Teacher – aged 29.

4. User appreciation about the Intrinsic qualities and drawbacks of ICT tools

As far as participants are concerned, the tools selected for the Communication Weeks (WWW, Videoconferencing, Forums) seem to be tools that can be used in teaching. On the other hand, no particular medium stands out from the rest. For the participants, the **advantages of ICT** are mainly " *An active method of Training* ", Male Trainee Teacher – aged 26, and to " *Reinstate a presence in Distant Learning* " Female

Trainee Teacher – aged 25, and the main disadvantage is the " *heavy cost of the equipment* ", Female Trainee Teacher – aged 25, and also some **drawbacks**:
" *It's not yet as easy as Desk Top Processing* " Female Trainee Teacher – aged 22. " *Sometimes we can feel lost with so many information* " Male Trainee Teacher – aged 23. "*...Take too much time* " Female Teacher – aged 33. " *The attention focused on technical aspect, may sometimes forgot the content of teaching and learning*". Female Teacher – aged 36.

Despite negligible technical problems for the forum and videoconference, participants were pleasantly surprised to discover the potential for exchange and communication between individuals and groups using synchronous and asynchronous tools: " *The videoconference was an important way of exchanging experiences from different teachers and trainees. Sometimes their experience where similar to our* ", Female Trainee Teacher – aged 25. " *The forum consisted in interactive process of communicating between different teachers and trainees, from different cultures* ". Female Trainee Teacher – aged 23.
" *The two main tools (WWW and videoconference) were a good combination that complemented on one another. There was however a wish for a chatting option in the forum. To some participants the idea of the WWW forum was new and needed some time for getting accustomed to* ". Male Trainee Teacher – aged 25. They also express their pleasure in seeing that someone had replied to a message : " *It's been very rewarding to see that someone answered our message (on the Forum)* ". Female Trainee Teacher – aged 27. The opinion of the groups regarding the choice of technologies reveals two emerging media, which seem complementary: videoconferencing and electronic conferences. It is perhaps worth noting that none of the groups suggest other media that could have been used.

Conclusions

Before the Communication Weeks, none of the participants suggested that in the future, ICT tools would not be part of the landscape of teaching. There was already some awareness among them about the interest of ICT tools but the Communication Weeks played the role of a trigger and open the door for many comments. On the whole they are very optimistic about the future of ICT Tools. All the participants are very keen on teaching and learning through ICT. Also the fact that they have chosen the teaching profession for themselves gives them a solid motivational background for developing their teaching profession. The mention of the obstacles are weak.

This Communication Weeks permitted to produce an analysis of the intrinsic qualities of ICT tools, but also a real commentary on the problems of establishing and maintaining such technical links. The views expressed in the groups and in the open questions highlight some of the abilities and skills required to use ICT properly, offering us the opportunity to sketch out a preliminary "curriculum ", but also to point out an awareness about their changing role and a great change in the learning/teaching process being more interactive and open.

The contribution of the multicultural cross country communication, create an identity, a recognition of a European global family. This European dimension could have became a World dimension : " *It would be interesting that the "European dimension" became "World dimension". What do they do in the other side of the ocean? Of course it is important knowing about the ideas and the work each country develops in Europe but everyday we are more and more citizen of the world and we shouldn't forget that* ". Female Trainee Teacher – aged 26.

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